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Swine Fever.*

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Definition.—Swine fever is a highly infectious and contagious disease peculiar to swine, due to an ultra-visible or filtrable virus.

History.—The earliest account of swine fever appears to be by Dr. Sutton, of Indiana, U.S.A., who described the condition in America in 1858. In England, swine fever does not appear to have been recognised as a special disease until 1862, when Professor Simmonds investigated a virulent outbreak in Wiltshire. A fatal disease of pigs, however, was known to Bristol dealers under the name of red soldier, red disease, or purples, for some time before that date, but it is questionable whether this disease known to them was swine fever or swine erysipelas.

Up to 1878 swine fever was allowed to spread unchecked by any regulations. After the passing of the 1878 Act, several Local Authorities urged upon the Privy Council the importance of including swine fever in the definition of disease under the provisions of the Act. An Order was accordingly made, entitled the Typhoid Fever or Swine Order, dated December, 1878, providing for the slaughter of diseased swine by the Local Authority, who also had discretionary power to slaughter swine that had been in contact with infected animals. The Order further provided that no swine should be moved out of the pigsty, or other place where the disease existed or had existed, within six days without a licence, and then only for slaughter.

In 1879 the return showed that 53 counties had been infected, 2,765 outbreaks occurred and 17,074 swine had been affected.

From 1878 to 1892 various measures for the suppression of swine fever have been adopted under the Orders of the Privy Council and the Board of Agriculture (formed in 1889). These measures include the slaughter of diseased swine and of in-contacts, the regulation of sales and markets, the prohibition of the movement of swine into certain districts, etc.

Etiology.—The actual cause of swine fever has not yet been cleared up, and as the subject is of more than passing importance, I propose to state the opinions of the various authorities.

Up to 1905 the so-called swine fever bacillus (*B. cholera suis*) was looked upon as the causal organism of the disease, but several peculiarities had been noted by the various investigators when experimenting with the bacillus.

Dorset, Bolton and Macbride, in U.S.A., noticed that when cultures were injected subcutaneously into pigs only slight disturbance followed, although after injecting intravenously or feeding in large amounts a severe illness frequently resulted. The symptoms and lesions set up frequently resembled those of swine fever, but did not possess its infectiousness, and those auimals which recovered from such a disease were not immune from natural swine fever.

It was thus shown that pure cultures of *B. cholera suis* possess considerable pathogenic powers for pigs, but also that the disease lacked several of the essential features of true swine fever. Experiments with filtered blood serum derived from pigs sick from swine fever and which was free from *B. cholera suis* show that such a serum produces illness with great regularity and that the disease set up possesses all the characteristics of the natural disease, including symptoms, lesions, contagiousness and infectiousness of the blood, and immunity in those animals which recover. From their findings they were forced to the conclusion that there existed in the blood of swine sick from swine fever some virus other than *B. cholera suis* and that this virus was necessary for the production of the disease. All attempts to discover this virus have failed so far on account of its ultra-microscopic or ultra-visible and filtrable characters. It passes through the finest filter, *viz.*, Berkfeldt, Chamberlain B and F filters. In common with other ultra-visible viruses, it cannot be cultivated artificially.

That the pathogenic power of the filtered blood is due to some living agent endowed with the power of reproduction and not to the presence of a toxin alone is seen from the fact that the disease induced by the filtered serum is communicable from sick to healthy animals by association and, moreover, from the fact that the disease induced by the filtered serum can be transferred to a second and third animal by inoculation, the serum being filtered each time prior to inoculation.

Dinwiddie, an American investigator, carried out, in 1912, some rather interesting experiments to test the infectiousness of serum and serum-free blood corpuscles, and the summary of his findings is as follows:—

(1) That the virus of swine fever as it exists in the blood is prominently intracorpuscular in habitat.

(2) That it occurs in serum or plasma by whatever mode they are obtained.

(3) That in shed blood it escapes from the corpuscles into the surrounding fluid with or without hæmolysis.

He goes on to say that the demonstration of the intracorpuscular habitat of an unknown virus leads to the assumption that the specific agent in that virus is protozoan in nature rather than bacterial, and from the results of his experiments it might be inferred at least with strong probability that the virus of swine fever is of this nature, viz., an intra-corpuscular protozoan organism.

King claims the cause to be a Spirochæt (*Spirochæta hyos*). Evidence of this is not forthcoming, however.

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Uhlenhuth has found cellular enclosures from the 5th to the 10th day. (Chlamydozoa.)

Tenacity.—Fluid material at room temperature retains its virulence from 10 to 14 weeks. Heating for one hour at 60° C. to 70° C. destroys the virus. Blood frozen below —18° C. and thawed out after 24 hours proved virulent. One per 1,000 perchlor. in proportion of 1 to 2, or 5 per cent. glycarb. in proportion of 2 to 5, does not destroy the virus within 8 days. Virus in old putrefying organs loses its virulence in 8 days.

Incubation Period.—In natural outbreaks the incubation period is usually about 11 days, but may extend to 14 days, whereas in inoculation experiments with virulent blood, the disease usually manifests itself in from 4 to 6 days.

Symptoms.—The symptoms are usually described by the various writers under the heads of acute, sub-acute and chronic, but Mr. Holman Berry, F.R.C.V.S., describes them under the heads of peracute, acute and chronic, and it is under these heads that I propose to describe them.

Peracute.—Under this head Mr. Berry included those cases in which, a large amount of virulent material having obtained entrance into the body at one time, the pig speedily sickens and succumbs before the appearance of any appreciable manifestation of illness or the development of any morbid appearance specially indicative of swine fever on *post-mortem* examination.

In these cases the usual history is that of sudden death, the owner or attendant finding the animal dead in the morning although apparently well enough the night before.

If the animals are seen during life they usually exhibit a temperature of 107° F. to 110° F., with complete prostration, offering no resistance to handling. This condition is mostly fatal and is most common in unweaned pigs and young fat stores.

Acute.—This type is the most easily recognised. The condition begins with a high temperature, 105° F. to 108° F., which falls gradually in the case of recovery, but in fatal cases remains high until immediately before death. The animal appears dull, listless, and shows little or no inclination for food. A short, husky cough is a fairly constant symptom and is best noted when first entering the sty. This cough is frequently followed by attempts at vomition and in some cases the act is completed. This cough in a good many cases is not due to any abnormal lung condition, but is apparently reflex and due to some reflex irritation of nerve terminals in the stomach, pharynx and larynx. Great thirst is usually shown, the animal sucking any liquid at hand and showing preference for any filthy pools of liquid excreta. Other types, again, appear too weak to stand or walk, and lie away in a dark corner, buried under the straw. There is frequently a yellowish, muco-purulent discharge from the eyes and nose, sometimes gumming the eyelids together and blocking the anterior nasal passages. Another symptom shown, though by no means common, but which must be looked upon with the utmost suspicion, is the sudden onset of a weeping, eczematous rash which quickly dries up, leaving circumscribed scabs scattered over the skin. This is most frequently seen in unweaned pigs, however, or newly-weaned ones, the ears being chiefly affected. This condition is more often followed by the chronic type, though it occasionally precedes the acute type.

Chronic.—Owing to the ease with which this type may be overlooked, it assumes all the more importance when a stamping-out policy, such as has been adopted by the Board of Agriculture, has to be taken into consideration.

Such chronic cases are fairly frequently sent for sale through public markets, and the knocking they receive in carts, trains, etc., to and from the market, combined with the change of surroundings and food which a change of ownership involves, reacts on the animals' economy and so produces an acute attack, with disastrous results to those non-immune swine with which they have come in contact. I can remember such a case when seeing practice some time ago. We had *post-mortem* examinations on some 20 odd pigs which were all returned by the Board of Agriculture as being swine fever. The history of every one was that they had been bought at Lanark Auction Market on a particular date. I may also add that these pigs were not all on the same place, but scattered, some being 20 miles apart.

In this chronic type there is no definite train of symptoms on which to base a diagnosis, but the following must arouse one's suspicions, *viz.*, unthriftiness, stunted growth, intermittent diarrhœa of a watery nature, and depraved appetite.

Skin Lesions.—In discussing symptoms, I have purposely left the question of skin discolouration to the last, as there appears to be great diversity of opinion as to whether skin discolouration is diagnostic of swine fever. Skin discolouration in swine is found to be associated with numerous diseased conditions other than swine fever, and on their presence or absence one must not place too much reliance. There is, however, one well-defined lesion on the skin which I think is only seen in swine fever, *viz.*, punctiform and petechial hæmorrhages situated on the abdomen inside of the thighs, hocks and axilla. In some cases there are thousands of these spots thickly disseminated and well-defined. Ulceration of the ear is also fairly common.

Post-mortem Examination.—The best method of carrying this out is to place the animal on the median plane of the back, supported by four bricks. Make an incision from the intermaxillary space (jowl) right down the middle of the neck and abdomen to the anus, disarticulate the sternum and cut out a piece of the abdominal wall on each side of your incision, everything being thus exposed.

Lesions.—These are best described under the heads of hæmorrhagic, ulcerative, and diphtheritic.

Hæmorrhagic.—This is the type which conveys the earliest manifestation of the disease. As the name indicates, the lesions are necessarily hæmorrhagic in type. A common picture is that of multiple petechial hæmorrhages scattered the entire length of the mucous coat of stomach and bowel, ranging in size from a mere speck to that of a pin's head. The appearance is quite characteristic and has been likened to the small pink spots on a peach. The affected bowel may show no other abnormality. The petechiæ in this type are not confined entirely to the intestinal tract, but are often seen on both endo- and epicardium, on the kidneys, in the lungs and on the pleura and peritoneum.

With reference to the petechiæ on the kidneys, this lesion is looked upon with great importance in America and constitutes the so-called turkey's egg kidney.

These petechial and small capillary hæmorrhages are in all probability determined by the presence of the virus.

Ulcerative.—Through the continued presence of the virus acting as an irritant, necrosis of the surrounding epithelium takes place. This necrosed portion becomes displaced and sloughs off, with the resulting formation of an ulcer. This process extends, affecting the submucous and underlying structures, the characteristic ulcer being the result. These ulcers are usually circular in shape, but may be irregular, varying in size from that of a pea to that of half-a-crown or bigger. The so-called typical swine fever ulcer is pathologically a more or less circumscribed area of necrosis, accompanied by an increase of the connective tissue of the adjacent parts. A true ulcer is formed frequently at the onset, the necrosed portion sloughing off, passing away in the fæces, leaving a depressed and often reddened centre considerably below the surface of the mucous membrane. The appearance is as if a piece of the mucous membrane had been punched out. When complete resolution has taken place the healed lesions are indicated by smooth, dense, whitish, circular areas of cicatricical tissue.

The colour of the ulcers varies from light yellow to brown or black, it being determined by the presence of bile pigments and iron sulphide of the alimentary canal.

There is no definite rule as to the number, shape, size and colour of the ulcers. They may be from one to hundreds, and the commonest seat is round the ileo-cæcal valve; next in order come the cæcum and colon.

Diphtheritic.—This form is characterised by the formation of a diphtheritic membrane or exudation (rich in fibrin) on the surface of the stomach and intestine, accompanied by necrosis of the underlying mucous membrane and sometimes submucous coat. Under ordinary circumstances the fibrinous exudation becomes firmly attached to the mucous coat, presenting a rough, firm, grey or black surface slightly raised above the surrounding normal parts. In acute cases the stomach and intestines are often greatly congested and swollen and much thickened, due to hæmorrhagic exudation under the mucous coat.

Diphtheritic membranes may be only slight in amount or in extensive patches, but only in rare cases do they appear on the whole of the small and large bowel, although diphtheresis is more common in the small bowel than ulceration. Sometimes you get the membrane running in ridges lengthways along the bowel.

Less Common Seats of Lesions.—Lesions may be found in any part of the alimentary canal. The tongue, lips, hard palate, pharynx and tonsils often show petechiæ and ecchymoses. Occasionally ulceration and diphtheresis are seen in the œsophagus.

Mouth ulceration, chiefly affecting the free border of the tongue, is by no means uncommon and is most often seen in unweaned pigs. Ulcers are occasionally seen on the limbs below the tarsus and carpus. The lungs, too, sometimes show what is termed swine fever pneumonia, appearing as smaller or larger areas of consolidation, with completely necrosed tissue yellowish or greyish in colour.

Lymphatic Glands.—In acute cases the mesenteric lymphatics are almost invariably enlarged and dotted over with petechiæ and ecchymoses. The other glands are usually swollen and congested, sometimes petechial.

DIAGNOSIS.—The diagnosis can only be definitely made by *post-mortem* examination, the finding of the specific lesion being, with our present knowledge of the disease, essential as final evidence of the existence of the disease.

DIFFERENTIAL DIAGNOSIS.—Before discussing differential diagnosis, let me enumerate some of the conditions which may be met with when investigating suspected or reported cases.

Priority must be given to those cases which are characterised by high fever, those of a definite septicæmic or toxæmic nature, *i.e.*, (*a*) swine erysipelas; (*b*) swine plague; (*c*) *B. cholera suis* infection; (*d*) anthrax; (*e*) inflammation of the serous membranes; (*f*) brine poisoning, and such conditions as tuberculosis, verminous pneumonia, enzootic pneumonia or cement disease.

I do not intend discussing all these diseases, but would like to mention one or two points of the more important.

Swine Erysipelas.—This disease is found more often in fattening and adult swine, although occasionally outbreaks occur in unweaned pigs, which are difficult to differentiate from swine fever, a positive diagnosis only being arrived at by inoculating a pigeon with scrapings from a spleen taken from an infected pig. In fattening pigs the disease takes on different forms. In the acute type the animal is usually found dead, the entire cutaneous surface being of a deep violet colour. *Post-mortem* examination reveals an acute congested appearance of the whole of the lymphatic glands. The serous sacs contain excess fluid. The heart shows *ante-mortem* clot. The intestinal mucous membranes never show definite petechial hæmorrhages, although there are sometimes patches of enteritis in the large bowel, with a thin diphtheritic membrane which is easily rubbed off. There are never petechiæ or ecchymoses in the mucous membrane of stomach or bowel and ulceration is never seen. In the sub-acute type commonly known as "diamonds," "blotches," and "measles," the animal suddenly refuses food, develops a high temperature and breaks out, as a rule, in diamond-shaped, reddish purple blotches, well raised above the surface of the surrounding healthy skin and sharply defined. This condition lasts from two to five days and recovery is the rule. Recovery from this condition frequently leaves valvular disease (verrucose endocarditis) which eventually kills the animal, the symptoms shown being laboured respiration and purple discolouration of the ears and extremities. Occasionally one sees the condition of advanced verrucose endocarditis on *post-mortem* where the pig died suddenly, the owner or attendant never having seen anything very much the matter with the auimal.

Swine Plague.—This disease is extremely difficult to differentiate because pneumonia is of such frequent occurrence as a complication of swine fever that its presence, even in severe form, cannot be regarded as proof of the absence of swine fever. Owing to the fact that the swine plague bacillus (*B. suisepticus*) is a normal inhabitant of the pig, demonstration of this bacillus does not negative a swine fever diagnosis. Only in cases where there are found uncomplicated lesions of pneumonia is the practitioner justified in excluding swine fever, and even then such a decision should be made with hesitation.

B. cholera suis Infection.—Occasionally in the *post-mortem* examination of pigs one meets with considerable

ulceration of the bowel. These ulcers are usually small white, and up to the size of a lentil, and look as though the bowel was sprinkled with bran. I have only seen one or two cases, but I believe it is met with fairly often. The disease is generally confined to one animal. These cases are probably due to secondary infection by the *B. cholera suis.*

Experimental inoculation of the *B. cholera suis* into the cæcum of rabbits set up first small white dots and later ulcers. One m.g. of a broth culture kills mice in from three to five days from septicæmia.

In pigs, by feeding large quantities of culture, either acute or chronic inflammatory and necrotic processes develop, according to the intensity of the infection. Dysenteric necrosis and ulceration of the intestinal mucous membrane result. This condition is never contagious.

Anthrax.—Spontaneous anthrax is comparatively rare in pigs. Evidence can usually be obtained of a recent sudden death from anthrax of some bovine. The characteristic swelling of the throat and subsequently a smear from the submaxillary lymphatic gland should remove all doubt.

Inflammation of the Serous Membranes.—This condition is commonly seen in small stores and is a chronic inflammatory condition affecting the serous membranes. The disease is evidently of a specific nature, as it is recorded that 50 per cent. of the stores on a premises have been affected. The appetite is usually capricious, the affected animals appearing dull and unthrifty and more or less pot-bellied. Sometimes a cough is present, the clinical picture being somewhat suggestive of chronic swine fever. *Post-mortem* examination soon reveals the cause, the affected serous membranes showing up white and roughened, with increase in the amount of serous fluid in affected serous sacs. The mucous coat of the stomach and bowel always appears normal. A small bi-polar organism can usually be demonstrated in smears made from the serous fluids, but whether this is a modification of the *B. suisepticus* or some other of the fowl cholera or hæmorrhagic septicæmia group has never been properly cleared up.

Brine Poisoning.—This condition is somewhat rare, but worthy of note, as it might be mistaken for swine fever. The symptoms are epileptic fits (animals attempt to climb the walls), profuse salivation, champing of the jaws., The fits increase in frequency and the animal becomes paralysed and dies. *Post-mortem* reveals gastro-enteritis which is not accompanied with any diphtheresis. Evidence can usually be obtained of the affected animal gaining access to salt or of brine being fed.

In making *post-mortem* examinations of suspected cases of swine fever, I would like to impress upon you that you should not mistake plugged follicles or plugged solitary glands in the ileo-cæcal valve for ulcers. The plugs in these can be easily squeezed out, leaving the empty follicle or gland a fairly large aperture with a smooth, healthy surface.

Tuberculosis.—This condition, with ulceration, is fortunately somewhat rare. The affected animals are in all cases in an extremely emaciated condition and coughing, the clinical picture being that of advanced tuberculosis.

Post-mortem reveals generalised tuberculosis, the mesenteric glands being invariably affected and the ulceration chiefly confined to the large bowel. The ulcer itself is a true ulcer and varies from the size of a pea to that of a shilling piece. It is crater-like, with somewhat thickened lips, the centre being filled with a yellowish-grey caseous-like material easily washed out. Smears reveal acid-fast bacilli.

Verminous Pneumonia (Thumps). In pigs the *Strongylus paradoxus* (*Matastrongylus apri*) is fairly common and chiefy seen in young pigs in the autumn, and of importance because it sometimes appears enzootically. We notice that different individuals suffer in various degrees. It is by no means uncommon for the animal to have a high temperature, which is probably due to a large number of eggs being hatched out at one time. In very young animals chronic debility often follows, which is somewhat suggestive of chronic swine fever. Positive diagnosis is made by microscopic examination of the nasal discharge or by *post-mortem* of a badly-affected pig.

Enzootic Pneumonia.—This condition occurs mostly as a chronic pneumonia, affecting only very young pigs. The symptoms develop early in the first days of life or between the 3rd and 4th week. The animals usually show a depraved appetite, a muco-purulent discharge from the nose, conjunctivitis and a short, sharp spasmodic cough brought on by rising and eating. This cough is usually associated with rattling and choking. The condition is generally met with in animals lying on cement floors and has been designated " cement disease."

Methods of Spread.—It is generally recognised that the diseased pig is the chief source of spread of swine fever, and on this account it behoves veterinary officers at markets and sales to look with the utmost suspicion upon any pigs in an unthrifty or emaciated condition. In fact, one is justified in saying that no unthrifty pig should be allowed inside any market or sale yard. Another point worthy of note is the question of swill feeding. When it is looked into carefully, it will be found that some feeders cook all their swill, whilst others feed it raw, and that the feeder on raw swill is the one whose pigs more frequently contract swine fever. A good case to demonstrate this happened in Birmingham some years ago. One of the railway companies kept all their hotel refuse for feeding their pigs—some 50 or 60. A new servant dumped a quantity of bacon rinds and ham trimmings into the swill tub. These were fed raw to the pigs by a new attendant. The sequel came a fortnight later when some of the pigs went off their food and in the course of another week every pig was down with swine fever. In this case no new pigs had been brought on the premises for the last three months. When one examines swill, it is usual to find a large percentage of ham trimmings and bacon rind, the majority of which are of American origin. Knowing the prevalence of the disease in America, it is quite feasible to say that the disease might be set up in this way.

The Boiling of Animals Foodstuffs Order of 1927 now makes it compulsory that all animal foodstuffs fed to pigs should be boiled for at least one hour.

Treatment and Prophylaxis.—There is no drug or medicine known which can be regarded as having any value as a cure or preventive of swine fever.

The following preventive measures should be rigidly carried out by pig owners and breeders :—

(1) Purchase swine for feeding and breeding only from farms and districts free of swine fever. Never purchase from public yards, sales or markets. Do not transport in common railway trucks or drive over public highways.

(2) Build pig houses and styes away from streams and public highways and arrange them so that they will not be traversed by men or animals.

(3) Quarantine all new stock for three weeks and admit to main herd after careful observation has proved them healthy.

(4) Cook all swill, etc., before feeding to pigs.

(5) After an outbreak of swine fever see that all carcases are burned or buried in lime so as to prevent re-infection.

The treatment of swine fever since the introduction of anti-swine fever serum has taken on a new importance. Its value as a saver of pig life is enormous and it is probably only a matter of time before a specific agent is placed in our hands which will bring nearer the day when swine fever will not be looked upon as such a hopeless scourge. Two methods of treatment by the anti-serum have been adopted, *viz.* :—

(1) The single or serum alone method.

(2) The double or serum simultaneous method.

Immunisation.—Recovery from an attack of swine fever confers an active immunity usually lasting the pig all its life. This led to the production of the anti-serum. Pigs, preferably weighing more than 150lbs., and possessing natural or acquired immunity, are selected. The common hyper-immunising method is to give a large dose of highly virulent blood. When hyperimmune 10 days after injection, the blood is either removed from the tail at intervals or at one final bleeding.

Serum alone method.—The dose is calculated at about 5 c.c. for every 25lbs. of bodyweight above the weight of 25lbs. Thus a pig weighing 25lbs. would receive 10 c.c., one of 50lbs. 15 c.c., and so on.

The most convenient place for the injection in unweaned pigs and small stores is directly into the ham, and in pigs too large to be easily handled, into the loose tissue behind the ear. Needles, etc., must be thoroughly sterilised. The most convenient method of preparing the site is to paint with Tr. of iodine. The injection confers a passive immunity lasting from 10 to 14 days and is also said to exert a curative effect on pigs in the early incubative period. Americans claim an immunity lasting from three to four months by this method, but experiments carried out in this country do not bear this out. It is quite probable, however, that these animals receiving such a dose had been turned in among infected swine, thus setting up a mild attack of the disease and converting their passive into an active immunity, which is really a modified simultaneous method of immunising and is highly recommended by the Ministry of Agriculture in this country.

Serum Simultaneous Method.—This treatment, I may say, is not allowed in this country because of the tendency to set up infection, but it is largely practised in America. It is unsuitable when the disease has not broken out and is largely used to protect healthy pigs. Give 20 to 30 c.c. of anti-serum with 1 to 2 c.c. of virulent blood (virus) depending on weight of animal. This confers a strong active immunity, usually lasting the pig all its life. The disadvantages are that the blood (virus) might be very virulent so that the animal soon sickens and starts an epidemic. In some cases the treated swine do not show any reaction whatever, whilst others show only a slight indisposition for a few days, depending probably on the amount and virulence of the infection, which may be due to one of several causes or to a combination of the causes:

(1) The animal may be extremely susceptible.

(2) Virus to which they have been exposed may be too virulent or the amount too heavy.

(3) The serum shows variations in protective power, owing to the impossibility of standardising, though all sera are tested before being sent out; still, it is quite understandable that its action cannot be uniform in all cases when one realises the varying degrees of virulence met with in different outbreaks.

Method of Control.—With suckers and small stores one should never have any difficulty. The most convenient method is to hold the animal securely by both hocks, with the abdomen facing the operator—somewhat similar to the method of holding for castration. Some assistants catch the pigs' forequarters between their knees, but the less restraint one puts upon them, the less struggling and the less likelihood of injuring the bone with the needle. In the case of old boars and sows, the best and most convenient method is to place the animal in a corner by means of a door, the door forming the base of a triangle from which the pig cannot escape. This method entirely eliminates the necessity for roping, which is not an enviable job at any time, and in the case of pregnant sows there is no risk of producing abortion through rough handling. Once the animal is penned in this manner, by careful handling and quietness the injection can be made behind the ear. For this method to be successful, it is necessary that the door be close boarded, as anyone with experience in handling pigs knows how a pig, when cornered, will attempt to escape through the smallest aperture.

Statistical.—The number of reported outbreaks inquired into in 1927 was 11,170, of which 1,794 were confirmed. Of these, 1,598 occurred in England, 62 in Wales, and 134 in Scotland.

As compared with 1926, this shows an increase of 3,528 reported cases, and 594 confirmed outbreaks (49·5 per cent.). The counties of Lanark, in Scotland, and the West Riding of Yorkshire, in England, show the highest number of confirmed outbreaks—33 and 150 respectively.

In conclusion, I would like to draw your attention to the importance of swine fever from a meat inspector's point of view. As already stated, *B. cholera suis* is practically always present, and since this organism is culturally, morphologically and serologically indistinguishable from *B. paratyphosis B*, which is nearly always associated with cases of food poisoning, a special examination is therefore called for.

It is common practice for owners of large herds of pigs with swine fever on the premises immediately to kill off all their stock, the intention being to get rid of the trouble quickly with a minimum loss both from death and in the normal working of their business.

In inspecting such in-contact cases, one is justified, in my opinion, in condemning all guts, stomach and bowels, and, in fact, the whole carcase where petechial hæmorrhages or an inflamed condition of the bowels and offal

are discernible. In such cases only a veterinary surgeon is qualified to make the examination.

I take this opportunity of thanking my Chief, Mr. Lloyd, for many valuable points and suggestions, and also my late principal, Mr. Peter Wilson, M.R.C.V.S., of Lanark, who first interested me in this engrossing subject. This paper is largely the outcome of tuition on this subject which I received from him.

Discussion.

Major J. Abson said he would like to congratulate Mr. Walker on his paper and asked if he had seen the condition in the bowels termed "thick-walled gut" met with occasionally in swine fever.

Mr. R. Hudson remarked that swine fever was a rare disease in his practice. He thought it would be interesting if Mr. Walker would say what symptoms in the live animal were peculiar to chronic swine fever, and also if any other disease caused the same type of ulceration in the bowel.

Mr. F. C. Fletcher congratulated the essayist on his successful effort in making a paper on swine fever interesting. One of the symptoms of swine fever he was once told to look for was a small squeal which a pig suffering from swine fever gives, cough and diarrhœa being often present. He had never seen the petechial spots on the skin mentioned by Mr. Walker and hoped that some day the essayist would show them to him.

Mr. W. Collinson stated that in his district many pigs were kept by colliers and very often reported to the police, who often referred them to a veterinary surgeon before notifying the Ministry, as many of the animals died from causes other than swine fever. He would like to know if that procedure was in order. He would also like Mr. Walker to say more about the serum treatment, price per head, dosage, etc. In swine erysipelas he got many losses and lately had commenced to use swine erysipelas serum which he always kept in stock. He thought that he was getting better results in the treatment of this disease.

Mr. S. E. Sampson said he thought Mr. Walker's paper very instructive and the only point upon which he would like further information was why there should be such delay by the Ministry in some cases in establishing a definite diagnosis of swine fever, which would allow the owner to decide what to do about the remaining pigs. He did not think swine fever was nearly so common as it used to be.

Mr. J. S. Lloyd said that if Mr. Walker could give them more papers which would draw such a good attendance he would propose that he should give them another soon. (Hear, hear.) One or two points did not seem to be clear so far as the diagnosis of swine fever and administration were concerned. The delay in arriving at a definite diagnosis of swine fever was often nobody's fault, because until ulceration was found the Ministry would not definitely confirm swine fever. He had seen cases where he was certain there was swine fever present, although he could not find the ulcers until three or four pigs had died. In one outbreak, very suspicious of swine fever, the disease was never confirmed because all the ailing pigs were killed off at the start and the disease seemed to disappear. The slaughter of pigs had been mentioned, but slaughter and compensation were only carried out for diagnostic purposes. The Ministry could not advise the slaughter of the remaining pigs, but might suggest it and allow the owner to please himself if swine fever was confirmed. The veterinary practitioner might with more safety advise the owner to slaughter. He had used swine fever serum in the treatment of the disease when supplied by the Ministry and obtained some good results. He thought the incubation period varied a great deal; in the case of one outbreak the pigs had been brought on to new premises and had had no contact with any other pigs, and developed swine fever three months after purchase. He thought those animals had brought the infection with them. In swine erysipelas he had seen sloughing of the skin, which was not often marked in swine fever.

Mr. C. S. Smith said he was a local inspector of the Ministry and if he found a dead pig he made a *post-mortem* and notified the Ministry. He also believed in telling the owner as soon as possible if it was a case of swine fever and recommended the slaughter of healthy, fat pigs on the same premises.

Mr. W. Tweed expressed his pleasure that Mr. Walker had given them a paper and had so fulfilled one of the duties of membership, making a very successful first attempt. They did not seem to make much progress in the prevention of swine fever. If swill was one of the chief means of spread, then the Boiling of Animal Foodstuffs Order should help in reducing the incidence of this disease, but that had not been the case, although he thought the Order was an excellent one from other points of view. One other factor in the prevention of the disease which he considered important was the exposure of pigs coming out of comfortable styes, being placed in open carts, and exposed in markets to the inclemencies of the weather, with perhaps a railway journey afterwards. This must act as a great factor in the spread of swine fever, by increasing the risk of infection by contact, and there was no reason why pigs in open markets should not have some protection from cold. Lobular pneumonia was a very common lesion in pigs' lungs met with in abattoirs, many of these animals having previously been sent to markets and travelled by rail. Swine fever serum was not enough used, good results having been obtained by its employment. That should be sufficient justification for the issue of that serum by the Ministry, as in the case of abortion vaccine, to those who liked to apply for it, or where it was advised by the Ministry. At present the expense of the serum acted as a drawback to its use.

Mr. T. Bowett asked if there was any difference in pigs' blood, for inoculation purposes, similar to the difference in the blood of different species of animals.

Mr. Walker, in replying, said that it was very gratifying to him to have stimulated such a discussion as had taken place.

Many of the points raised had been answered by Mr. Lloyd and Mr. Brennan, of the Ministry of Agriculture, which made the task of replying easier.

Mr. Abson's point about thick-walled or "hose-pipe" gut he had explained in his paper under the head of diphtherisis, although not using the term "hose-pipe gut."

In reply to Mr. Hudson, there were no definite symptoms in chronic swine fever other than those of unthriftiness, emaciation, spasmodic cough, and so on. Ulceration in the bowel might be due to sporadic cases of *B. cholera suis* infection and causing similar lesions to those of swine fever. These, however, were very uncommon and ulceration other than that met with in swine fever was seldom encountered.

The petechiæ on the skin he hoped to demonstrate one day to Mr. Fletcher.

Mr. Collinson's points regarding administration were dealt with by Mr. Lloyd, and as far as serum treatment was concerned, he thought it was justified.

Mr. Bowett referred to inoculations made with blood and asked if there were any dangers accruing from the use of blood from different pigs in the same way as met with in humans. Mr. Walker said he took it that Mr. Bowett was thinking particularly of blood transfusion in humans—certain specific types receiving blood required similar types of blood in order that no agglutination took place. There were no such recorded instances in any different breed of animals of the same species in which this precaution had to be taken. The only danger was from the injection of blood into different species, which was liable to set up anaphylaxis because of the injection of the foreign protein.

Mr. Walker hoped that his reply had cleared up most of the points and thanked them for the honour of being asked to give the paper.

The Physiology of Milk Fever. II.

By PIERRE A. FISH, Ithaca, N.Y., Cornell University.

(*Continued from page 1075*).

GUANIDIN EXPERIMENT.

On April 5th, 1927, we had an opportunity to try the effects of this substance on a Holstein heifer weighing 405 kilograms (980 lbs.). She had aborted, February 4th, producing a calf about eight months along. This was her second calf and she was now giving five quarts of milk in the morning and two quarts in the afternoon. Her temperature at 10 a.m., prior to the experiment, was 101·4° F. At 10-25 she was injected intramuscularly (gluteal muscles, left leg) with 200 c.c. of a solution containing 60·75 grams of guanidin carbonate, a dosage of 0·15 grams per kilogram. Twenty-five minutes were consumed in introducing the solution, which was alkaline in reaction. A sample of blood was taken immediately after the injection. She was placed in a box stall and within a half-hour showed marked signs of restlessness, lying down and getting up seven times during the following hour. The respirations were increased. At 12 o'clock the temperature had fallen to 101° F. At 1 p.m. it was 100·8° and there were evident muscular tremors (tetany) which were confined to the left-hind quarter. At 3 p.m. the temperature had fallen to 100·5°; 3-20 p.m., second sample of blood. At 5-40 p.m. the cow was down and did not get up when approached. The temperature had risen to 101·8° F. An occasional slow twitch of the muscles in the parotid region (both sides) was observed.

TABLE II.—*Results of blood tests (mg. per 100 c.c. of blood) following injection of guanidin carbonate.*

	Just after Injection	4½ Hrs. after Injection	28½ Hrs. after Injection	46 Hrs. after Injection
Sugar	44·8	56·1	52·6	50·6
Urea	11·3	10·4	14·5	12·4
Total non-protein nitrogen	18·0	19·5	22·8	21·0
Total non-protein nitrogen (less urea)	6·7	9·1	8·3	8·6
Calcium	12·0	13·0	11·0	12·0
Refractive index of serum	1·3495	1·3500	1·3500	1·3491

April 6th (next day), 9 a.m., temperature 102·3° F. The heifer was standing up and looking bright. She gave her usual two quarts of milk the night before, but the following morning gave only half her usual amount. At 3-25 p.m., 5 c.c. (100 units) of parathormone (Lilly) was injected intramuscularly. April 7th, 9 a.m., temperature 101·8° F. Apparently normal.

In all, four samples of blood were taken for examination: (1) immediately after the injection of the guanidin carbonate; (2) 4½ hours later; (3) 28½ hours; and (4) 46 hours. The last sample was taken 17½ hours after the parathormone (McCollip's extract of the parathyroid glands) had been injected. The results of the blood tests are given in Table II.

While the observed signs may apply to other conditions than milk fever, some are nevertheless suggestive: the restlessness at the onset, subnormal temperature, respiratory disturbance and muscular tremors. The blood tests showed a moderate increase in the sugar, urea and total non-protein nitrogen, and agrees to some extent with the conclusions of Hayden[15] whose evidence was based on averages obtained from the study of 27 cases of milk fever.

A comparison of the percentages based on Hayden's results with those of the guanidin experiment is given in Table III. The figures of the first blood test are taken as the normal of the animal and the percentages of the guanidin experiment are based on them. The *data* cover the average of the three days of the experiment; two days of which the animal appeared to be entirely normal. Hayden's *data* cover a shorter period.

TABLE III.—*Comparison of the percentages according to Hayden with those of guanidin experiment.*

	First Samples (27) (%)	Second Samples (9) (%)	Guanidin Experiment (%)
Sugar increase ...	85·1	32·2	18·7
Urea increase... ...	52·2	25·5	9·7
Total non-protein nitrogen increase ...	24·0	27·0	17·2
Non-protein nitrogen (less urea) increase...	7·3	27·8	29·2

The difference seems to be principally one of degree. In each the same constituents were increased in amount and the same prolonged disturbance in the nitrogenous metabolism appeared. The most marked effect of the guanidin appears to be upon the non-protein nitrogen other than urea.

The calcium constituent of the blood showed little appreciable change, even after the administration of the parathormone. Our results are suggestive of a relatively mild effect from the guanidin. If larger or repeated doses could be given, or if a cow showing a deficiency of blood calcium could be used, there would probably be more complete and satisfactory effects.

Guanidin experiments were also conducted on frogs and guinea-pigs. In the frogs there resulted twitching of the toes, and in the guinea-pigs "shivering" suggestive of tetany. The injections of the guanidin carbonate were made intra-abdominally.

HYPOCALCÆMIA IN MILK FEVER.

The relation of the parathyroid glands to the calcium metabolism of the body has already been referred to. Little and Wright, testing the blood of six healthy cows, obtained as an average 10·01 mg. of calcium per 100 c.c. of blood. Meigs gives the normal values as varying from 9 to 11 mg. per 100 c.c. of plasma. In eight cows "down" with milk fever, Little and Wright found the average to be 5·14 mg., with a range of 4·1 to 7·1 mg. A second test, made after the cow returned to normal, gave an average (six cases) of 9·61 mg., ranging from 8·1 mg. to 10·45 mg. Four additional cases are reported separately in which the average of the four when the cows were "down" was 5·41 mg., and when normal (24 hours to three weeks) the

average was 7·6 mg. These cases occurred upon the same farm, and are noteworthy in connection with the low *normal* value of the blood calcium concentration. The animals were also slow in their recovery from the disease, and it is suggested that dietetic factors may play an important part in the causation of milk fever.

A calcium deficiency and, perhaps, quite as important, a deficiency of vitamin D, in the diet may very reasonably be expected to have a predisposing influence as factors.

We have thus far applied the calcium test to only three cases of milk fever, in which the blood samples were taken before the udder was inflated, and found the average of the three to be 4·8 mg. of calcium, thus confirming the work of Little and Wright so far as cases "down" with the disease are concerned. The limits of time required for the blood calcium to return to the normal amount, during or after recovery, are not very definitely defined in Little and Wright's paper, and our own cases are too few to throw much light on the subject. In our own case 14, the pre-inflation calcium was 6 mg.; after 1 hour and 25 minutes it was 5·6 mg. In case 15, the pre-inflation calcium was 3 mg.; in two hours it had increased to 7·5 mg. In case 16, no blood sample was taken at the onset of the disease; the udder was inflated, and ten and one-half hours after the first inflation, the cow not doing well, a second inflation was given. Immediately after this inflation, a blood sample was taken and showed 11·3 mg. of calcium. Fifteen and one-half hours later, another blood sample showed 9·6 mg. of calcium. Both amounts represent normal limits and presumably were reached as a result of the first and subsequent inflations. Case 17 showed a pre-inflation calcium of 5·5 mg.; one hour later, 5·75 mg.

The return of the blood calcium to its normal amount is apparently a relatively slow process. There is probably no contribution to the calcium of the blood from the mammary gland similar to the hyperglycæmia (lactocæmia) following inflation, where there is evidence that lactose passes quickly into the circulation. The gradual return of the calcium to normal is apparently due to the prevention of its further loss in the milk by the inflation of the udder, with, we may assume, an improvement in the tone of the parathyroid glands and their power to regulate calcium metabolism.

A hypocalcæmia theory seems to afford a more satisfactory explanation for certain of the symptoms of milk fever than does that of a hypoglycæmia. There is a point of analogy, however, in the two theories, in that with the onset of lactation a new channel is provided for the loss of calcium as well as glucose from the body. Up to the time of the birth of the calf, there has been a drain on the calcium resources of the mother to develop the offspring (fœtal skeleton, etc.) and with the new and increased demand for calcium in the colostrum and milk, especially in heavy milkers, the calcium reserve of the body may be dangerously depleted and the breakdown occurs. It is conceivable that even before lactation begins, the calcium reserve may become overtaxed in the development of the calf, especially if there is a deficiency of calcium in the diet; and thus account for the exceptional cases of milk fever occurring before the calf is born, or in the exceptionally late cases of the disease, the continued drain of the calcium in a heavy milk yield, coupled with an inadequate supply of calcium in the food, may bring about disaster.

Little and Wright,[9] as an example of the drain of calcium from the body in the production of colostrum, estimate that a cow weighing 1,200 pounds contains 100 pounds of blood and the percentage of calcium in the blood is 0·01, for the weight of the calcium in the total volume of blood is 0·01 pounds (approximately 4·5 grams). They estimate the weight of one gallon of colostrum at 10 pounds and the calcium in the colostrum at 0·2 per cent., and the weight of the calcium in a gallon at 0·02 pounds (approximately 9 grams). The secretion of a half-gallon of colostrum would be sufficient to deplete the blood of all its calcium, supposing there was no reserve store in the body from which the blood might replenish its content. They also point out that, in their milk fever cases, the fall in the calcium content of the blood always ran parallel with the severity of the symptoms.

Cameron[17] states that cow's milk averages 120 mg. of calcium per 100 c.c.—a quantity ten to twelve times higher than that found in the blood—and indicates the power possessed by the mammary gland in concentrating that amount from the 9 to 11 mg. present in the blood. Quoting Meigs, it is stated that a cow during 133 days of lactation lost 1,300 grams (approximately 2·7 lbs.) of calcium, estimated at 19 per cent. of its total body calcium, the loss being continuous; the milk output was about twenty pounds per day. There is, correspondingly, marked storage during the dry period. McCollum and Simmonds[18] state that of all the elements in the body, calcium is present in the blood in most constant amounts.

The endocrine influence in the control of important bodily functions is now too well established to be ignored: insulin regulates sugar metabolism; thyroxin, the iodin metabolism, and the parathyroids, the calcium metabolism, although vitamin D and the ultra-violet rays also have claims for consideration in this matter, as well as a possible guanidin function.

Cases of Milk Fever.

Concise reports of thirteen cases have already been recorded in the papers of Fish[1] and of Hayden.[4] Four additional cases are herewith presented:—

Case 14. March 23rd, 1927. Medium-sized pure-bred Jersey cow, 11 years old; normal parturition; heavy milker. Temp., 98·4°; pulse, 75; resp., normal, except for expiratory groan. Animal shivered considerably (tetany), and was covered with a blanket. Three samples of blood were taken. Six ounces of glucose dissolved in one quart of water were injected into the jugular vein just before the second blood sample was taken. Recovery.

Case 15. March 26th, 1927. Six-year-old Holstein cow. Found sick in the morning. Lying on right side, with head on left flank. Had been covered with a heavy blanket. Temp., 93·6°; pulse, feeble (80?). A blood sample was taken and the udder inflated; 10 c.c. of camphorated oil injected intramuscularly. Seen 1¾ hours later, she appeared brighter. Temp., 94·4°. Another blood sample taken and another blanket advised. Recovery.

Case 16. April 6th, 1927. The cow was staggering about, apparently coming down with the disease, at 9-30 a.m. Temp., 98°. The udder was inflated but no blood sample was taken at this time. The cow did not

improve. In the evening she was in a semi-comatose condition. Temp., 101°; pulse, 48; resp., slow. Udder inflated again at 8 p.m., 10½ hours after the first inflation. A blood sample was taken immediately after the second inflation. The next day (April 7th), at 11·30 a.m., 15½ hours after the first sample, another specimen of blood was obtained, and after this, glucose was administered. Recovery.

Case 17. May 16th, 1927. Grade Holstein, 10 years old. Calved during the night. Was "down" in the morning. Had partially cleaned. Head on flank. Temp., 98·9°. Appeared dull. Udder inflated. Seen one hour later, the temperature was 100·5° and the udder again inflated. Two blood samples were taken and. after this, 25 grams of glucose in 50 c.c. of solution were given intravenously. Recovery.

TABLE IVA.—*Results of the blood examinations (mg. of sugar and calcium per 100 c.c. of blood) of case 14, March 23rd, 1927.*

	Pre-inflation	25 Minutes after inflation (Just after Injection of Glucose)	85 Minutes after inflation (1 Hour after Injection of Glucose)
Total sugar ...	101·6	122·0	312·2
Glucose	101·6	89·5	262·0
Lactose	0·0	32·5	50·2
Calcium	6·0	6·0	6·0
Refractive index of serum ...	1·3472	1·3480	1·3480

TABLE IVB.—*Results of the blood examinations (mg. of sugar and calcium per 100 c.c. of blood) of case 15, March 26th, 1927.*

	Pre-Inflation	110 Minutes after Inflation
Total sugar	113·4	174·9
Glucose	113·4	119·1
Lactose	0·0	55·8
Calcium	3·0	7·5
Refractive index of serum	1·3470	1·3480

Tables IVA, IVB, IVC, and IVD give the results of the blood examinations.

TABLE IVC.—*Results of the blood examinations (mg. of sugar and calcium per 100 c.c. of blood) of case 16, April 6th, 1927.*

	Pre-Inflation	10½ Hours after Inflation	26 Hours after Inflation
Total sugar ...	No blood samples taken	198·4	71·1
Glucose		174·8	63·2
Lactose		23·6	7·9
Calcium		10·5	9·6
Refractive index of serum ...		1·3481	1·3489

TABLE IVD.—*Results of the blood examinations (mg. of sugar and calcium per 100 c.c. of blood) of case 17, May 16th, 1927.*

	Pre-Inflation	1 Hour after Inflation
Total sugar	87·3	85·2
Glucose	87·3	82·1
Lactose	0·0	3·1
Calcium	5·5	5·75
Refractive index of serum	1·3488	1·3488

In two cases there was a rise in the refractive index of the serum after inflation. In the third case there was no pre-inflation sample, but a sample taken 10½ hours after the first inflation gave figures comparable to the two other post-inflation cases. In the fourth case there was no change in the pre- and post-inflation samples.

DISCUSSION.

In our opinion, none of the seventeen cases examined by us has shown a true hypoglycæmia. The lowest amount of blood sugar in our series was 45 mg. (Case 4) and is within our normal range. The majority of the cases showed an increase in the amount of the sugar.

The increased amount of sugar found in the blood after inflation, we believe we have successfully demonstrated, by the aid of the Folin-Svedberg fermentation test, to be due, for the most part, to the absorption of lactose from the mammary gland, and the minor increase of the glucose after inflation is due to the fact that it is no longer used by the gland for the production of lactose, and thus has an opportunity to accumulate in the blood.

As far as our work has gone (three cases) we have been able to confirm the observations of Little and Wright, that a deficiency of calcium is present in the blood of cows "down" with milk fever. Their work does not give definite information as to the length of time required for the calcium to rise to the normal level; nor have we sufficient *data* to throw light on that point. The indications are that it rises, after defunctionising the gland by inflation, and while it is not being used by the gland, it accumulates gradually to the normal amount.

Using the Clark-Collip modification of the Kramer-Tisdall method, we have obtained as an average of 35 tests from nine *normal* cows, 11·7 mg. of calcium per 100 c.c. of blood. This is somewhat higher than that of Little and Wright (10·01 mg.), who made their determinations from the ash of the blood. Ours were made upon the serum, and the presence of protein material and possibly some inexpertness in the earlier tests may explain our higher average.

Although Dryerre and Greig, so far as we know, were the first to offer plausible suggestions connecting the symptoms of milk fever with a parathyroid deficiency, especially in relation to guanidin intoxication, their suggestions were purely theoretical. The work of Little and Wright seems to be the first to offer positive evidence that the parathyroids are incriminated so far as calcium metabolism is concerned. Whether a hypocalcæmia can explain all of the symptoms of milk fever is problematical; nd remains to be determined. Our single guanidin

TABLE V.—*Results of sugar examinations (total sugar mg. per 100 c.c. of blood), 17 cases.*

Case	Date	Pre-Inflation	Length of Time after Inflation.								
			10–25 Mins.	30–55 Mins.	60–95 Mins.	105–160 Mins.	3–5 Hrs.	10–12 Hrs.	17–18 Hrs.	21–27 Hrs.	42 Hrs.
	1926										
1	10–7	68·7	109·6	137·5							
2	10–10	70·7									
3	10–14	62·2	81·3	131·1							
4	10–23	45·0	73·3	87·1							
5	10–29	77·8	111·5	108·0	99·6	87·0					
6	12–31	62·7	77·7	113·4	119·4	74·7					
	1927										
7	1–13	49·0	60·0	64·0	62·1	R					
8	1–24								114·13*		
9	1–24	80·0	111·6	116·8	114·6	140·0	140·0		93·2	63·5	51·3
10	1–27	127·8	151·0†	160·0	165·3‡	202·2	168·0			137·6	
11	2–3	114·2		132·0	145·6						
12	2–18			101·3§	133·6						
13	2–18	80·6	90·0	113·2			114·2				
14	3–23	101·6		122·0‖	312·2						
15	3–26	113·4				174·9					
16	4–27							198·4		71·1	
17	5–16	87·3			85·2						
Average		81·5	96·2	115·5	137·5	135·76	140·7	198·4	103·66	90·7	51·3

R = Re-inflated.
* Average of three tests in one hour.
† Injection of 20 grams of glucose immediately after pre-inflation sample of blood was taken.
‡ Udder inflated 90 minutes after glucose injection.
§ This sample of blood was partially coagulated.
‖ Six ounces of glucose in one quart of water were injected.

TABLE VI.—*Results of glucose determinations (mg. per 100 c.c. of blood).*

Case	Date	Pre-Inflation	Length of Time after Inflation.								
			10–25 Mins.	30–55 Mins.	60–95 Mins.	105–160 Mins.	3–5 Hrs.	10–12 Hrs.	17–18 Hrs.	21–27 Hrs.	42 Hrs.
	1926										
6	12–31	62·7	59·5	74·9	72·6	42·7					
	1927										
7	1–13	49·0	60·0	64·0	53·01						
8	1–24	—	—	—	—	—	—	—	114·13*		
9	1–24	80·0	97·77	77·5	94·24	79·3	92·5	—	93·2	63·5	51·3
10	1–27	112·5†	135·80	142·85	150·08‡	153·88	106·83	—	—	62·6	
11	2–3	114·2	—	111·78	110·4						
12	2–18	—	—	101·3	133·6						
13	2–18	80·6	90·0	84·2	—	—	79·2				
14	3–24	101·6	—	89·5§	262·0						
15	3–26	113·4	—	—	—	119·1					
16	4–6	—	—	—	—	—	—	174·8‖	—	63·2	
17	5–16	87·3	—	—	82·1						
Average		89·03	88·61	93·25	119·75	98·74	92·84	174·8	103·66	63·1	51·3

* Average of three tests in one hour.
† Twenty grams of glucose injected.
‡ Udder inflated.
§ Six ounces of glucose injected.
‖ Just after second inflation.
—No material available at period indicated.

TABLE VII.—*Results of lactose determinations (mg. per 100 c.c. of blood).*

Case	Date	Pre-Inflation	Length of Time after Inflation.								
			10–25 Mins.	30–55 Mins.	60–95 Mins.	105–160 Mins.	3–5 Hrs.	10–12 Hrs.	17–18 Hrs.	21–27 Hrs.	42 Hrs.
	1926										
6	12–31	0	18·2	38·5	46·8	32·0					
	1927										
7	1–13	0	0	0	9·09						
8	1–24	—	—	—	—	—	—	—	0		
9	1–24	0	13·83	39·3	50·36	60·7	47·5	—	0	0	0
10	1–27	15·75*	15·17	17·15	15·22†	48·32	61·17	—	—	75·0	
11	2–3	0	—	20·22	35·2						
12	2–18	—	—	—							
13	2–18	0	0	29·0	—	—	35·0				
14	3–24	0	—	32·5‡	50·2						
15	3–26	0	—	—	—	55·8					
16	4–6	—	—	—	—	—	—	23·6§	—	7·9	
17	5–16	0	—	—	3·1						
Average		1·75	9·44	25·24	29·99	49·2	47·89	23·6		41·4	

* Twenty grams of glucose injected.
† Udder inflated.
‡ Six ounces of glucose injected.
§ Just after second inflation.
—No material available at period indicated.
0 Test made, with negative results.

experiment on the cow is too incomplete to afford much evidence, but the blood picture points to some extent toward that of milk fever. The blood calcium, however, was not affected by the guanidin.

That tetany (muscular tremors) may be induced by a hypocalcæmia is now pretty well established. That tetany can be induced by guanidin has been demonstrated by Watanabe[19] in rabbits, and in our own experiments. Whether the latter is just a pharmaceutical effect, or whether some other explanation is necessary, has not been determined. The two forms of tetany do not seem to be identical. In guanidin tetany Watanabe finds that, unlike the tetany induced by thyro-parathyroidectomy, it is not abolished by the administration of calcium.

Healy and Kastle[10] appear to have been the first to note a marked increased in the urinary ammonia in cases of milk fever. Our test, on a single case, was confirmatory of their observations. Watanabe in his guanidin experiments noted a great increase in ammonia in rabbits, and this observation would seem to lend support to the view that guanidin may be a factor in milk fever. An increased amount of ammonia in the urine may also be due to a condition of acidosis in the body or to derangement of function of the liver. These results, in connection with the increased total non-protein nitrogen and urea in the blood, first noted by Hayden,[15] are suggestive of an upset of the nitrogenous balance of the body, which, considered with a hyperglycæmia, point strongly to defective oxidation as an important factor. Gergens and Baumann[20] state that guanidin is very resistant to oxidation in the animal body. If it can be demonstrated than an excess of guanidin is actually present in milk fever, it may assist in explaining the prolonged nitrogenous disturbance in the blood.

With a hypocalcæmia demonstrated and the possibility of guanidin intoxication accounting for some of the symptoms of milk fever, the evidence incriminating the parathyroid glands is strengthened. Their regulation of the calcium metabolism of the body is now generally accepted; their regulation of the guanidin metabolism is not so clear and is held in doubt by some. At this stage, although some of the symptoms of milk fever point to the presence of guanidin, it is a necessary requirement that its presence, in the body in undue amount, shall be actually demonstrated.

The more refined technique, in recent years, for blood analysis has made it possible to extend and simplify our knowledge of certain of the constituents. This has been of great benefit in the diagnosis and prognosis of certain diseases and is demonstrating its value in connection with milk fever. In conjunction with urine analysis, information of value has already been gained and there is promise of still greater achievement and ultimate solution of the problem. The inflation of the udder, so effective as a cure and so simple of application, may be found to produce more manifold effects than are generally attributed to it.

The findings suggest, as a remedy for the conditions found, in the way of prevention, that a diet containing a sufficient supply of calcium should be available during the period of pregnancy; and for a time prior to parturition and for a short time after, that a limitation of the nitrogenous food would be desirable. Little and Wright, under experimental treatment, state that benefit has been derived from both intravenous and intramuscular injections of calcium chloride in 10 per cent. solution, 30 to 40 c.c. being injected and repeated, if required, in six to eight hours. When possible, calcium lactate can be given orally in doses of 40 grains every three hours with benefit. Udder inflation in conjunction with the above treatment is an advantage.

SUMMARY.

1. The cases of milk fever (44) examined in our laboratory have failed to show a true hypoglycæmia, but rather an increased amount of blood sugar, agreeing in this respect with the recent results of some other investigators.

2. The average (75 tests) for blood glucose of 51.75 mg. per 100 c.c. of blood, established by Hayden a few years ago, appears to be none too low. Later tests on cows, for a period of ten monthly intervals, indicate a still lower average of 45.5 mg. per 100 c.c. (48 tests). A range of 40 to 60 mg. is apparently a safe one for the average normal cow. Hayden's averages for oth r blood constituents (total non-protein nitrogen, urea, creatinin, uric acids and chlorides) may serve as standards for comparison with pathological conditions.

3. No important difference in the amount of the blood sugar content in dry cows and those in milk has been observed in our experiments.

4. The fermentation test applied to the blood of milk fever patients has demonstrated in our cases, with only one exception, that the hyperglycæmia at the onset of the disease is due to glucose and that lactose generally did not appear in the blood until after inflation of the udder. Following inflation, the moderate increase in glucose in the blood possibly is due to its non-conversion into lactose in the mammary gland.

5. The experimental injection of 3½ to 4 litres of normal saline solution into a normal cow, aside from its effects on the circulation produced a stimulating effect upon the kidneys and intestines and quite markedly increased the glucose content of the blood.

6. The experiments of Seitter afford evidence that inflation of the udder increases the blood-pressure.

7. Hayden's examinations of the blood of milk fever cases reveal an increase in the non-protein nitrogen constituents and indicate that the nitrogenous metabolism is not restored to normal until after the "apparent" recovery of the animal.

8. A marked increase in the amount of the urinary ammonia may assist in the explanation of a hyperglycæmia in milk fever. The experiments of Horvath are suggestive; but an endocrine factor may be involved. Watanabe's experiments with guanidin hydrochloride suggest its possible connection with the increased amount of urinary ammonia, which may also be correlated with a condition of acidosis in the body or a derangement of hepatic function.

9. The hyperglycæmia and disturbed nitrogenous metabolism point to defective oxidation processes in the body.

10. The deficient amount of calcium in the blood, with a possible increased amount of guanidin in the body, affords strong evidence that the parathyroid glands are involved.

11. The various conditions referred to, with more or less supporting evidence, indicate the presence of a complex series of phenomena in milk fever.

Thanks are due to the staff of the Ambulatory and Consulting clinics for the interest and co-operation manifested; for reports of cases and the procurement of blood samples. Also to Dr. C. E. Hayden, who has made all of the sugar tests, including the fermentation method for the determination of lactose; for suggestions and other valuable service.

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SCOTTISH FARMERS' UNION AND THE TUBERCULIN TEST.

At a meeting, held early in the month, of the Central Executive of the National Farmers' Union of Scotland, the president reported upon a deputation that met the Scottish Board of Health and the Board of Agriculture for Scotland as to the desirability of an inquiry into the whole matter of the tuberculin tests and the method of their administration. Producers had, he said, been gravely disturbed by the recent Lesmahagow case. Scientific opinion was so much divided on the subject that an influential committee should be appointed forthwith to advise as to a definite pronouncement, otherwise progress towards the eradication of tuberculosis would be seriously retarded. It was felt that unless the authorities showed some anxiety to get to the root of the cause of the sudden reaction of large numbers of cattle which, shortly before the tests, had been regarded as free, there would be continued doubts as to whether the tests were valid, and whether the administrative authorities were showing a genuine desire to assist producers, who are in sympathy with the movement towards the eradication of the disease.

It was unanimously agreed to press the Government to take action on the lines indicated.

SHEEP-WORRYING AND ALSATIANS.

At the same meeting it was reported that representations had been made to the Board of Agriculture for Scotland regarding the measures which should be adopted to stop the evil of sheep worrying. On a resolution from the Lanark County Executive it was agreed to protest against the statement recently made by the Under-Secretary for Home Affairs in the House of Commons that the present law was sufficient to protect the public against Alsatian dogs. Experiences in Lanarkshire reported within the last few months were sufficient to show that these dogs constituted a grave menace.

The Veterinary Record

22nd December, 1928.

A Merry Christmas to all our Readers.

DISTEMPER RESEARCH.

Elsewhere in this issue of the *Veterinary Record* will be found an account of the visit of the Royal Counties V.M.A. to the Farm Laboratories of the National Institute for Medical Research, where most interesting and instructive addresses on the subject of vaccination against canine distemper were given by Major Dunkin and Dr. Laidlaw. A very useful discussion followed, in the course of which many points of practical and clinical importance were raised. Our object in referring to the event at this juncture is to emphasise the great advantages that must necessarily follow collaboration and discussion between the research workers and the clinicians. There has formerly been a too great tendency for the laboratory worker to detach himself from workers in the field, with the result that much of his work has been wasted. One class does not always realise the difficulties and limitations of the other. A practitioner may imagine it to be a comparatively simple procedure to produce a vaccine for any given specific disease and he may fail to understand the complexity of the procedure, especially when the causal agent is not morphologically demonstrable. On the other hand, the researcher may make recommendations which are quite impracticable because he fails to recognise the great differences that occur between the conditions in the laboratory and experimental station, and the complicated and constantly varying conditions in general practice. Hence it follows that the best results can only be expected where there is collaboration and an open and free discussion of the knotty problems as they occur and by those who meet them in their varying aspects. Moreover, it conduces towards that harmonious working which is absolutely essential to complete success.

The meeting in question amply illustrates the advantages to which we have referred. The very excellent and lucid addresses of Major Dunkin and Dr. Laidlaw served not only to explain many of the difficulties they have had to overcome in obtaining their splendid results, but they cleared up so many points of doubt and difficulty in the minds of their listeners. On the other hand, the discussion raised points of great practical importance which no doubt will be followed up by the investigators, such as the duration of immunity, the apparent difference between the period of incubation as it occurs under laboratory and experimental conditions and under conditions of general dog-life, such as may be called "street" conditions, and the necessity for a protective serum such as may be serviceable for animals that have been exposed to infection or are in the early stages of the disease. Another important point that was apparently not raised is the question of the possible carrier whether he be recovered from a natural attack or have been immunised by means of a potent virus. We are indeed grateful to Dunkin and Laidlaw for work already done and heartily wish them success in the further work they have still to do.

It may be a little interesting to speculate on the possible ultimate results of this great saving of dog life and suffering. It has been suggested that probably over 50 per cent. of all dogs born die of distemper. The entire dog population must inevitably increase enormously and we can well imagine ourselves being overrun with dogs unless some control is instituted, such as that exercised by the Kennel Club during the war. And what of the veterinary surgeon's prospects? Since the advent of the motor and the reduction of horses canine practice has been his main source of income in many of the larger towns, distemper being responsible for most of it. Will the greater numbers vainly attempting to dodge the increasing motor traffic compensate by casualties? We hope not, but how shall we make our living in the cities? Presumably we must all become municipal veterinary officers and specialise in meat inspection, or migrate into the country.

Truly it may be stated that the veterinary profession is an altruistic one. They have been responsible for the extermination of cattle plague, contagious bovine pleuro-pneumonia, sheep pox and glanders, and now they have subscribed liberally towards the discovery of effective vaccination against distemper, the advent of which must inevitably and enormously reduce their prospects of a moderate income. It is to be hoped that they will have some compensation in the application of the vaccination, for it may well be a risky proceeding to place living and dangerous virus in the hands of any other than registered practitioners of medicine. In connection with this, it is pleasing to draw attention to the announcement by The Wellcome Foundation on this subject, which appears below.

Dog Distemper.

An important report submitted by the Distemper Research Committee to the *Field* Distemper Council and the Medical Research Council appeared in the newspaper press on the 29th November. It stated that the Committee's investigation had reached a point when the knowledge acquired was capable of being usefully applied in practice to rendering dogs resistant to infection by distemper.

The report added that with the object of providing the means of preventive treatment the Committee had invited a laboratory well equipped for the commercial development of these results to undertake the preparation of the vaccine used with a view to its distribution.

As is only to be expected when a scientific announcement of such importance is made, great interest has been aroused amongst veterinarians and owners of dogs, and numerous enquiries have been made as to where the vaccine can be obtained. It is deemed advisable, therefore, to inform those interested that The Wellcome Foundation are actively engaged in undertaking the conversion of the experimental laboratory processes into large-scale production, and in due course hope to be able to issue the vaccine through Messrs. Burroughs Wellcome and Co.

This firm intends provisionally to restrict the commercial distribution of the Canine Distemper Vaccine to the veterinary profession.

ROYAL COLLEGE OF VETERINARY SURGEONS.

Membership Examinations—December, 1928.

List of Successful Candidates.

DUBLIN.

Class A.
*Lambert, N. H.

Class B.
Hynes, M. W. G.
Spears, Miss K. M.

Class C.
Boyle, J.
Fitzgerald, J.
Jarrel, K. U. K.
O'Brien, H. V.
O'Connell, J. L.

Class D.
Lowndes, J.
McGeady, P. A.

LIVERPOOL.

Class A.
Burnett, Miss E. A. R.
*Edwards, A. E.
Greenhalgh, R. L.

Class B.
*Jenkins, E. D.
Lilburne, J. F. W.

Class D.
Curtis, Hugh
*Marginson, G. C.

GLASGOW.

Class A.
†Chester, R. W.
Mackinnon, J.
Paterson, E. S.

Class B.
Catchpole, Miss A. M.
Mackenzie, Colin
*Mossinson, D.

Class C.
Kent, R. K.
Kinghorn, F. J.
Slavin, G.

Class D.
Barclay, A.
Budge, J. W. E.
Watt, G.

LONDON.

Class A.
Ince, E. B.
*Kinnear, Miss J. M. F.
Luckham, H.
Robson, H. M.
Torres, M. J.

Class B.
Crosfield, P.
Greenwood, E. R.
Hasan, S. M.
Lamb, E. M.

EDINBURGH.

Class A.
Ball, J. C. P.
*Baird, Peter.
*Hardy, F. B.
MacDonald, D. H.
McGranaghan, J. A.
*McIndoe, J. S.
Sumpter, H.
Swift, R. J. A.
*Thomson, A.

Class B.
Anderson, J. R.
*Hossack, H. W. J.
Mackay, E. M.
McLeod, M. M. K.
Morris, J. A.
Oliver, G. M. G.

Class C.
Gray, W. J.
*Hammond, R. A.
Massey, R. T. H.
Orr, W.
Stewart, C. A.
Strachan, C. G.

Class D.
Davidson, C. B.
Grasovsky, Y. S.
Harcourt, K. W.
Paley, R. W.
Priestley, F. W.

† denotes 1st Class Honours.

* denotes 2nd Class Honours.

Liverpool B.V.Sc. Examinations.

The following is the University of Liverpool, School of Veterinary Science, Examination List for December, 1928, in connection with the University Degree of B.V.Sc.:—

Second Examination.—*Part* I.—Sidhom, N. B. *Part* II.—Sidhom, N. B.

Bovine Tuberculosis in County Wicklow.

At a recent meeting of County Wicklow Board of Health, at which a letter was read from the Local Government Department with reference to the necessity for the establishment of a comprehensive scheme for the treatment of human tuberculosis in the county, the following brief but significant discussion took place:—

Mr. Henry: Why not start where you should start—with the cows? There is not a single word about tuberculosis in cows. The medical people must know how many cases of tuberculosis come from the milk of tuberculous cows—that is one of the biggest questions. I understand that a great many cases amongst children are due to drinking milk from cows affected with tuberculosis; undoubtedly a great number of our cattle are affected with tuberculosis. It is prevention that we want. The milk is, I believe, primarily a method of spreading tuberculosis amongst children.

Mr. Heatley: I don't altogether agree with my friend. To my own knowledge there are children of the towns who hardly ever taste a drop of milk.

Mr. Henry: The question is, how many of these children are affected with bovine tuberculosis?

Dr. Boyd-Barrett said that tuberculosis had gone down by 50 per cent. in twenty-five years.

The matter was recommended to the careful consideration of the County Council.

CLINICAL AND CASE REPORTS.

Case Suggestive of Atypical Purpura Hæmorrhagica.

By W. Lyle Stewart, M.R.C.V.S.,
Armstrong College, University of Durham.

The following case, which resembles atypical purpura hæmorrhagica, was brought to my notice by Mr. W. H. Blackburn, M.R.C.V.S., of South Hetton, and concerns a young pit pony which fell ill and had to be destroyed under unusual circumstances. The pony was six years old and had worked satisfactorily underground since September, 1927, until reported sick in July, 1928. When examined by Mr. Blackburn the animal had an œdematous swelling confined to the abdominal and pectoral muscles. It was thought at the time that the animal had sustained an injury to the region, probably by falling on the rails while at work.

After a fortnight's rest and appropriate treatment the pony was put to work, but was again sick in September, 1928. The illness was now more acute in nature, with diarrhœa and slight œdematous swellings of all legs, similar to what is observed in purpura hæmorrhagica. There was no swelling on the abdomen. The pony was brought to the surface, but in spite of treatment the diarrhœa and œdema of the limbs continued, and the skin sloughed from the back of the carpus and from the front of the hock-joints. For a time the course of the illness seemed stationary and the pony continued to eat small portions of crushed oats and hay. Later it became emaciated and weak so that it could not rise without assistance. It was destroyed in October and a *post-mortem* examination made.

Post-mortem.

Macroscopic.—The abdominal cavity contained about one gallon of sanguineous fluid and the small intestines throughout their entire length were much thickened with what appeared to be large hæmorrhagic plaques. Unfortunately, the accompanying photograph was not taken until some time after death, when the swellings had somewhat contracted. The plaques were very numerous on the free or convex edge of the bowel; they possessed a rosy-red colour and were about the size of a half-crown. When cut and examined the bowel resembled tracheal tissue. The mucous membrane was corrugated throughout and was not unlike the characteristic lesion of Johne's disease.

The mucous membrane, however, was seen to be normal, the corrugations being due to contraction of the underlying tissues. A careful search for parasites was made in the intestines, since it was thought that the diarrhœa might be due to worms, but there was no evidence of parasitic infestation. The large intestine appeared perfectly normal and there was no detectable lesion in any other internal organ, with the exception of the visceral peritoneum which was congested. There was evidence of an injury to the left mesenteric artery.

Microscopic.—Sections were cut through the bowel plaques and examination showed the new tissue to be inflammatory in origin. The mucous membrane showed a slight increase in cellular content, and there was increased vascularity of the submucosa. The muscularis mucosa was infiltrated with mononuclear cellular exudate, but the gross histological change was a large amount of tissue proliferation in the subperitoneal coat of the intestine. The condition was, therefore, a sub-acute inflammatory process, and the bowel plaques were the result of proliferation of the subperitoneal coat, not causing substitution, but superimposed upon the tissue already existing. In structure the plaques were seen to be composed of well-formed granulation tissue, plentifully supplied with blood vessels and collagen fibres. There was a large amount of inflammatory cellular exudate, consisting of monoclear leucocytes, lymphocytes and polymorphonuclears and blood pigment. The new tissue was also infiltrated by an amount of œdema. Cicatrisation of the superimposed tissue was responsible for the distortion which was seen both by the naked eye and microscopically.

Discussion.

The sudden onset of illness and the œdematous swellings suggested purpura hæmorrhagica. The *post-mortem* examination, disclosing the peculiar swellings on the small intestines, likewise favoured such a diagnosis, because, although the writer is not aware of similar lesions being found in this disease, the intestinal plaques have a close resemblance to the flat circumscribed urticaria-like swellings of the skin usually associated with purpura hæmorrhagica. If indeed this animal was affected with purpura hæmorrhagica, it must be regarded as an atypical case, since not only was there no history of previous illness, but petechial hæmorrhages were entirely absent from the visible membranes during the course of the illness.

An Interesting Case of Intestinal Calculi in the Horse.

By Henry Taylor, F.R.C.V.S., Haywards Heath.

Somewhere about seven years ago a groom showed me a "stone" (*i.e.*, calculus) which he had found amongst the fæces of one of the horses over which he had charge. The horse was the property of a jobmaster, and as he was cleaning out the stable one morning the fork he was using struck against something hard, which, on investigation, proved to be the above-mentioned calculus. Being interested, he brought it to me for my inspection, and on examining it I found that it was approximately the size of a large plum, with one facet (or perhaps it was two—I speak from memory) where it had rubbed against one or

two other calculi. It was quite evident from the above signs of attrition that the object had not been alone in the intestine, and I remarked that the poor animal had some more stones inside him. For the time being the matter rested there and I cannot remember seeing the horse again.

At the expiration of approximately seven years, as this animal's usefulness had decreased and his advancing years had made him past work, he was destroyed. The groom, remembering my words of long ago, asked the knacker to search for more "stones," with the result that more were found.

Meeting the groom one day shortly afterwards without knowing anything about the old horse having been put down, he asked me if I recollected the occurrence many years ago when he showed me the stone, and my remarks thereon. As a matter of fact I had forgotten all about it, but it was brought again to my memory. He then produced a number of calculi which had been found by the knacker at the *post-mortem*. These were of the phosphatic variety, numbered seven in all, and varied in weight from just over 9 oz. down to 3½ oz. Two were triangular.

The total weight of the seven amounted to 2 lb. 9½ oz. Now comes the interesting review of the case. This horse had worked in a cab and in a light van for seven years, and far from showing any signs of colic or other abdominal trouble during that period, had never missed a meal or been laid up for any cause whatever. During the last week before he was destroyed, he seemed very weak and once or twice he stopped when pulling the van up an incline and began to tremble. The work seemed too much for him; he was very old and to all intents and purposes beyond the task. On these occasions he was led home, but seemed none the worse after a short rest. He did not appear to need any treatment, so none was adopted. It may be suggested that these times when he stopped with the van and trembled during the last few days of his existence, were occasions when the calculi caused pain. It is quite possible; but, on the other hand, even admitting this, it must have been very evanescent, for he was all right when he got to the stable; moreover, it was only during the last few days of his life that such things took place. The horse was about 13 or 15 when he was bought, so he must have been at least 20 when he was destroyed.

I do not suppose this case is unique; one does meet with calculi of such size that they must have taken a long time to grow, but here is a case in which we know that they must have been in existence for seven years. Moreover, there is the record of having a clean bill of health during all that period.

Yew Poisoning in the Horse.

By Henry Taylor, F.R.C.V.S., Haywards Heath.

A cart horse that had been turned out as usual at night time, was brought into the stable at 7 a.m. and commenced to eat the hay which had been put in the rack. Shortly afterwards the owner heard a noise in the stable and on going there found the animal ill. By 9 o'clock he was dead.

I wish to draw attention to two conditions met with at the *post-mortem* examination which was made an hour or two later:—

First, the condition of the lungs, which were engorged with black blood; the congestion of the peritoneum covering the stomach, and the large ecchymoses on the outside of the heart.

Second, the finely-divided state of the food in the stomach in contra-distinction to the ingesta of the cow in yew poisoning. As the horse masticates and grinds his food, it follows that the particles of the leaves would be in a finely divided state of division and might easily have been overlooked, if one had not had some sort of idea that yew poisoning might be the cause of death, as we had in this particular case. As a matter of fact, the owner happened to notice that a yew tree had been browsed. In the cow, of course, there is no difficulty in finding shoots or twigs, to determine the matter.

To recapitulate—If one had not suspected yew poisoning and made just a casual slash into the stomach (the mucous membrane of which was not inflamed), and not examined the contents away from the greater curvature, one might, from the appearance of the heart, lungs and peritoneum, have attributed death to some bacterial poison.

I am indebted to my locum tenens, Mr. Urquhart, for his help in the case.

REPORT.

Veterinary Officer's Report for New South Wales.

The Department of Agriculture, New South Wales, Science Bulletin No. 30, contains the Livestock Diseases Report by Max Henry, M.R.C.V.S., Chief Veterinary Surgeon. The report deals with control work in connection with diseases of animals during the year ended 30th June, 1927.

Bovine Contagious Pleuro-Pneumonia.—One of the heaviest duties of the staff is the control of bovine contagious pleuro-pneumonia, and this work has resulted in keeping the dairying districts of the coast free from infection. This area contains about three-quarters of a million cattle and is the richest dairying district of the State. In order to maintain this freedom a quarantine line has been placed round the district, and cattle are only allowed in on licence from an Inspector.

The disease is most active in the western and northern districts. Outbreaks are dealt with by inoculation of all cattle, which are then kept in quarantine for sixty days from the date of the last death or destruction. At the end of the quarantine period the subsequent movements of the cattle are controlled by an Order from the Stock Inspector, this control being maintained for a period of twelve months. Every encouragement is given to owners to consign such cattle for slaughter.

Efforts were made to trace the origin of infection in all outbreaks, and in most cases this was attributable to the movement of cattle from Queensland. Owing to the nature of the disease and the presence of "carrier" animals it is not possible to prevent this invasion by inspection of stock on entering the State. In many cases consignments of cattle from Queensland were inspected several times while travelling through the northern district of New South Wales and no signs of disease were detected, yet disease broke out among them after arrival in the western district.

Lice and Keds in Sheep.—Although the country is free from sheep scab, the presence of sheep lice and keds causes considerable trouble, and during the year under review 415 holdings were quarantined on this account. Here, as in Great Britain, the chief obstacle to success is the difficulty of impressing upon sheep owners the need for effective dipping.

Swine Fever.—New South Wales is normally free from swine fever, but in February, 1927, the disease was introduced into the County of Cumberland with pigs from Victoria. With one exception all the pigs had been distributed within the County of Cumberland, which area had fortunately been maintained as a quarantine area. Consequently no pigs had left the area without a permit, and tracing was comparatively easy.

By the 28th March orders were given that no permits were to be issued and the introduction of pigs from Victoria was prohibited for three months. This was followed later by prohibiting the entry of fresh pork, and by requiring the disinfection of all carts which had been used for the conveyance of pigs before the carts entered New South Wales.

The holding of any public sale or show of pigs within the County of Cumberland was forbidden for a period of two months except at one saleyard, from which pigs could only be taken to one of two abattoirs, where no pigs were kept.

The disinfection of railway vehicles received special attention.

The outbreak was of considerable virulence, and a policy of slaughter of both affected and in-contact pigs was adopted. All pigs which had left County Cumberland during the two months prior to the outbreak were traced, but evidence of disease was found at one place only, where two outbreaks resulted.

Forty-eight outbreaks had occurred in County Cumberland up to the 30th June, 1927.

Tuberculosis.—By June, 1927, 19 herds, comprising 679 animals, were declared tubercle-free. The total number of animals tested during the year under all circumstances was 1,510 of which 7.7 per cent. reacted. In herds under test in connection with the tubercle-free herds scheme 240 animals were tested for the first time, of which 4.6 per cent. reacted. No reactors were found in declared tubercle-free herds on re-testing.

Anthrax.—Twenty-one outbreaks of anthrax were dealt with during the year under review, involving 46,749 sheep, 159 cattle and 16 horses, and resulting in the death of 791 sheep, 14 cattle and 1 horse. The numbers of vaccinations reported are 291,915 sheep and 1,069 cattle.

Army Veterinary Service.

London Gazette—War Office—Regular Army.

Dec. 11th.—Lt.-Col. H. S. Mosley, D.S.O., is apptd. Comdt. R.A. Vet. Sch. and Sch. of Farriery (Nov. 28).

Regular Army Reserve of Officers.

Capt. R. M. Lawson, M.R.C.V.S. (late R.A.V.C. (Mila.)). to be Capt. (Nov. 20), with seniority May 8, 1927.

DIVISIONAL REPORTS.

Royal Counties Division.

Visit to Mill Hill Farm Laboratories.

Dr. Laidlaw and Major Dunkin on their Distemper Investigations.

For their meeting on Friday, 30th November, 1928, the members of the Royal Counties Division, N.V.M.A., were privileged to enjoy a programme to which concurrent events added a special piquancy. The carrying out of the arrangement to visit the Farm Laboratories of the National Institute for Medical Research, near Mill Hill, Middlesex, followed immediately upon the publication of the progress report submitted by the Distemper Research Committee to the Field Distemper Council and the Medical Research Council, embodying the report in which Dr. P. P. Laidlaw and Major G. W. Dunkin made the momentous announcement that dog distemper immunisation has been found possible. The opportunity of visiting the scene of this recent triumph under the guidance of the investigators themselves, through the kindness of the Director of the Department of Pathology, Captain S. R. Douglas, F.R.S., and of participating with them in a discussion on the work, naturally attracted an excellent attendance. Those present were :—Messrs. W. L. Little (President), J. R. Baxter, J. Bell, R. E. C. Bullen, H. B. Collet, Majors P. W. Dayer-Smith, A. C. Duncan, G. W. Dunkin and R. C. G. Hancock, Messrs. J. R. Hewer, T. W. Lepper, G. P. Male, J. W. McIntosh, B. A. McGuire, Major H. Kirk, Major-General Sir John Moore, Lieut.-Colonel P. J. Simpson, Major M. E. Tennant, Major F. J. Taylor, Lieut.-Colonel G. K. Walker, Messrs. Ernest Wilkinson, F. W. Willett, J. Willett, R. A. Willett, Professor G. H. Wooldridge, and Mr. H. Bell, Hon. Secretary.

Visitors.—Dr. P. P. Laidlaw, Messrs. J. Blyth, W. Waters, D. E. Wilkinson and W. Wylie.

At the outset, a brief business meeting was held, with the President in the Chair.

The minutes of the last meeting of the Division, having been published in the *Record*, were taken as read and were confirmed.

Correspondence.—(1) Letters of apology for inability to attend the meeting from Mr. J. H. L. Addis, Captain W. A. Austin, Captain A. Barr, Major W. K. Barron, Major R. Catmur, Mr. J. C. Coleman, Major J. J. Dunlop, Mr. E. J. Heather, Principal F. T. G. Hobday, Major H. C. Jagger, Major H. G. Lepper, Mr. J. McKerlie, Mr. S. Pennington, Mr. H. L. Roberts, Major G. Rees-Mogg, Mr. S. H. Slocock, Professor A. R. Smythe, Mr. F. T. Trewin, Captain S. Villar, Mr. W. Western and Mr. A. E. Wood.

(2) From Mr. A. R. Smythe, who recently vacated the Chair of Materia Medica and Therapeutics at the Royal Veterinary College, London, in order to assist his father in practice at Falmouth in the failing health of the latter, requesting the Division to accept his resignation.

Professor Wooldridge, in proposing that Mr. Smythe's resignation be accepted with regret, informed the meeting that Mr. Smythe's father had since passed away. The members would doubtless wish that a message of condolence

with Mr. A. R. Smythe in his bereavement should accompany the acceptance of his resignation.

The meeting unanimously concurred.

(3) From the Secretary of the N.V.M.A., covering a draft scheme for the treatment of sick animals of the poor, circulated to all its Divisions by the "National" at the request of the Royal College of Veterinary Surgeons.

It was agreed to procure a number of copies of the draft scheme for circulation to members of the profession within the area of the Division, all of whom, whether members of the Association or not, should be invited to attend the Annual Meeting in January, to which occasion it was decided to defer consideration of the matter.

(4) From the Secretary of the National Horse Association of Great Britain, inviting the Division to support the endeavours being made by the Council of the Association to further the interests of the horse, and suggesting affiliation at an annual fee of £1 1s.

Sir JOHN MOORE warmly commended the suggestion to the members. His personal opinion was that the National Horse Association was from all points of view worthy of support. (Hear, hear.) It was very necessary in these days to maintain interest in the horse and to encourage horse breeding, in particular—because, as they all knew, horse breeding had suffered very considerably in recent years. Some would remember how a few years ago the Geddes' Axe descended heavily upon the work and the agricultural bonus given for the encouragement of heavy horse breeding was withdrawn, but the situation became so serious that the grant had to be restored. Light horse breeding was taken up by the Army, which made a great success of it. He mentioned these things as they appeared to him clearly to indicate the attitude which they, as a professional body, should take in regard to the efforts which were being made by the National Horse Association. An important feature of its activities was the campaign against slippery roads, whilst one of its Committees was a Publicity Committee, of which he was a member. Quite recently that Committee had brought out a little pamphlet explaining the objects of the Association, and thereby it was hoped to increase the membership, which would do good to the horse, and, incidentally to the veterinary profession. In next week's *Veterinary Record* a resumé of the pamphlet was being given, and members of the "National" were asked to apply to the Secretary of the N.H.A. for copies.

He desired to make a definite proposal, that the Royal Counties V.M.A. affiliate with the National Horse Association at a cost of £1 1s. annually. Individuals could become members at 10s. 6d., but he thought it would be a very good thing for the "Royal Counties" to associate itself actively with the Association. He was convinced that it was a very good Association to join and that they should, as a body as well as in their individual capacities, do their best to encourage an animal which had been the means of livelihood to a good many of them. (Applause.)

Mr. J. W. MCINTOSH seconded the proposal, with which he sympathised most heartily. He felt very strongly that all members of the profession should do everything they possibly could to encourage horse breeding and to stimulate the use of the commercial horse. The guinea per annum would, indeed, be well spent.

Mr. G. P. MALE (Hon. Treasurer) supported the proposal, saying that the Society could well afford it, and it was carried unanimously.

Nomination to Membership.—Captain David Wyllie, of Southampton, was nominated as a member of the Division, on the proposition of Colonel P. J. SIMPSON, seconded by Mr. G. P. MALE.

ELECTION OF OFFICERS.

Introducing consideration of this section of the proceedings, the PRESIDENT said: I believe that it is usual for the President to propose his successor in office for the ensuing year, but before doing so I should like to take this opportunity of thanking the members for the way in which they have supported me during my year of office. I think we have had a successful year—(hear, hear)—and much of that success was due to the fact that Major Duncan's paper occupied two meetings in the earlier part, producing splendid discussions and very good attendances. Major Dunkin, also, has come to my assistance in connection with the present meeting, by making arrangements which I am sure we all greatly appreciate and which will make a noteworthy termination to the series over which I have had the privilege of presiding. (Applause.) It gives me very great pleasure to propose to you that Mr. Hewer, the senior vice-president, be elected President for the ensuing year. (Applause.) Mr. Hewer is very well known to all of us; he has been a member of the Division for a long time and a very regular attender at its meetings, while he has always done everything he possibly can to make our meetings a success. Mr. Hewer is one of those most useful members who is continuously bringing *post-mortem* specimens to the meetings, and when the Division held its meeting at Swindon he did a great deal to make it exceptionally interesting and enjoyable. I am sure that we cannot do better than elect Mr. Hewer as our new President.

The election was made with acclamation.

Vice-Presidents.—The retiring President, Major A. C. Duncan and Major G. W. Dunkin.

Council.—The President, Hon. Secretary and Hon. Treasurer (as *ex-officio* members), Mr. J. Baxter, Professor J. B. Buxton, Mr. J. W. McIntosh, Colonel P. J. Simpson, Major F. J. Taylor, Mr. F. W. Willett and Mr. J. Willett.

Following the election of Council, Professor G. H. WOOLDRIDGE gave notice that he would move "that the rule governing the constitution of the Council be amended to provide for the inclusion of Vice-Presidents as members of Council."

Hon. Auditor.—Mr. J. Willett (re-elected).

Hon. Treasurer.—Mr. G. P. Male (re-elected, with a vote of thanks for his past services).

Hon. Secretary.—Mr. H. Bell (re-elected). The PRESIDENT, in putting Mr. Bell's name to the meeting, remarked that he did so with exceptional pleasure and confidence. Mr. Bell had assumed office under rather difficult circumstances, owing to the inability, due to his ill-health, of Major Catmur to continue. While they lamented the latter's enforced withdrawal, in circumstances which they all so sympathetically deplored, they had been fortunate to find in Mr. Bell a worthy and hard-working successor. Their new Secretary had his duties well in hand; in fact,

he had several papers arranged for, which was almost an unprecedented state of affairs. (Applause.)

Representatives on N. V.M. A. Council.—Colonel P. J. Simpson, Mr. J. Willett and the Hon. Secretary (*ex-officio*).

Next Meeting.—It was agreed to follow the custom of recent years in holding the Annual General Meeting and Dinner at Reading on the last Friday in January.

Colonel G. K. WALKER conveyed to the members the very pleasing information that there had recently been a distinct improvement in Major Catmur's condition, and that their late Secretary was progressing very satisfactorily. This was supplemented by the PRESIDENT, who read a communication which he had received from Major Catmur in which the latter regretted that he would be unable to attend that or several future meetings, but expressing the hope that their meeting that day would be an outstanding success.

It was unanimously agreed to send the affectionate greetings of the Society to Major Catmur, expressive of the members' pleasure at the report of his improved health and their heartfelt wishes for the continuance of that improvement.

A TOUR OF THE PREMISES.

At the invitation of the President, Major DUNKIN now outlined the remaining activities of the afternoon. He desired, in the first place, to apologise for the absence of Captain S. R. Douglas, the Director of the Department of Pathology of the Institute, who was in Germany, and who desired him to extend to them his sincere regrets for his inability to be present with them that afternoon. He (Major Dunkin) was, in fact, very sorry that so much prominence had been given to his name in connection with that demonstration, because his distinguished colleague had had as much to do with its arrangement as he had, if not more.

It was proposed to divide the company into two sections. To one section Dr. Laidlaw would give a short demonstration concerning what they termed the infective distemper unit, and the other section he (Major Dunkin) would conduct round the healthy, normal unit. The two sections would then exchange ground. When the demonstrations had been completed, all would return to the place of meeting, to take part in an impromptu discussion opened by Dr. Laidlaw and himself.

Major Dunkin first led his party to the compact yet airy building housing the healthy susceptible ferrets to the number of 250. It appears that there is a uniformity of degree of severity of an attack of distemper in the ferret which is not seen in the dog, and that in the former the disease runs a more regular course—facts which render invaluable the use of the ferret as a medium for distemper experimentation. In this structure ferrets are bred at the rate of about 300 a year, the average per litter being 10. Adult ferrets are fed on four ounces of fresh horse meat and four ounces of milk per day, the milk being obtained from the Institute's own cows, which are tuberculin tested. The ferrets maintain a splendid standard of health and those maladies which are the bugbear of ferret-keepers, foot-rot and otorrhœa, are non-existent.

The party then proceeded down the grass-covered slope to the breeding compound at the bottom of the enclosure. This compound was rendered necessary (explained Major Dunkin) by the unfortunate experience of other workers, and not only did they decide to breed their own experimental animals, but so to house them that there could be no possible chance of infection gaining access to them. To this end, the compound is situated some three or four hundred yards from all other buildings on the farm. It consists of kennels and runs, a food preparation house, a bungalow for the kennel maids and a building called the cleansing house. The whole is surrounded by a corrugated iron fence (six feet high and buried three feet in the ground to keep out rats) except the food preparation house and the cleansing house, which are bisected by the fence. The cleansing house affords the only means of ingress and egress. The kennel maids, who alone possess keys to this building, change therein on returning from outside, bathe, and then don their sterile kennel clothing. The only other entrants are Major Dunkin himself, on occasional visits of inspection, and the necessary mechanics, all being completely clothed in rubber and disinfected. That procedure has been in successful operation for five years.

The food preparation house comprises an inner and an outer section, into both of which the members were permitted to go. The outer half is used as the food store, and in the inner the visitors were interested spectators of the working of the sterilising plant. This house is in charge of an attendant.

The kennels, arranged in pairs to the number of 16, are lit by electricity, but are unheated. Some of the dogs were brought into view by the kennel maids. Considerations of pedigree obviously had no place in their selection, but they were a very hardy looking lot, and special attention was drawn to " Smoker," one of the first bitch puppies born in the compound 4½ years previously, which had provided the compound with 54 of her kind. " I have never been a believer in the artificial heating of kennels," said Major Dunkin, " but I have been somewhat astonished to see how successfully breeding operations can be carried out under such spartan conditions. One litter was, in fact, born in a snow storm." In the first one and a half years 110 puppies were reared, rickets being prevented by the use of codliverised food. The animals are practically free from worms, after the adoption of 3½ years' intensive preventive measures, and lice and otorrhœa are unknown amongst them. "We never get any trouble," declared Major Dunkin, "and my experience here has taught me a tremendous lesson in dog breeding." Each kennel is covered in by wire netting, to keep birds out, and the flooring is concrete covered with a bitumastic substance, impervious to moisture, for the reason that this allows of their being washed out daily, the eggs of the ascarides being almost impossible to destroy. No bedding is used, the dogs lying on a raised wooden platform.

To his party, Dr. LAIDLAW described the structure and uses to which is put the building which houses the infective unit of distemper. This is known as the dog hospital and, as its name implies, was originally intended for use as a hospital for experimental dogs. It is an elaborately constructed building, consisting of fourteen cubicles,

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each being completely shut off from its neighbour. The walls of these cubicles and, in fact, of the whole building are covered with fibro-cement, as is also the ceiling, while the flooring is of the same material as that used in the kennels. The entrances, two in number, are passages ten feet long and four feet wide, so constructed as to form an antiseptic bath floorway, in which is always kept a 2½ per cent. solution of lysol, about 3in. deep. Every member of the staff has to wade through this bath before he can gain entrance, and rubber boots have thus to be worn. As a matter of fact, a strict rule is kept that every entrant must be completely clothed in rubber and even then he must not enter the cubicle of a sick animal until he has been washed down with some reliable disinfectant. It was found, however, that despite this rigid routine, infection spread from cubicle to cubicle, and after careful sifting of evidence they were driven to the conclusion that the disease was air-spread. That brought to an end the system of keeping control dogs in that house, which was now used solely for the housing of sick ferrets. It was thus concluded that infection by air spread, over limited distances, especially in a closed building, may occur. Experimental dogs are now cared for in the isolated cage kennels dotted about the premises, no two of which are less than thirty feet apart. These were subsequently inspected by the members, who were told that the mortality from cases of distemper which were not of the nervous type, and without complications, was surprisingly small. Dr. Laidlaw, in the course of the inspection of the isolated kennels containing dogs for experimentation, detailed courses of inoculation to which these had been, and are being, subjected in the carrying out of the distemper investigation.

Returning to the room in the Laboratory in which the meeting was to be resumed, the members were met with the refreshing sight of well-laden tea tables, and at this stage in the proceedings a break was made for the enjoyment of Major and Mrs. Dunkin's greatly-appreciated hospitality.

The Discussion.

Major Dunkin, in opening the impromptu discussion which now ensued, said, in the course of his remarks, that he must apologise for not presenting them with a paper that afternoon, but he hoped he had adequately explained to their Secretary the reason why he had been unable to do so. Dr. Laidlaw and he wanted, in the first instance, to talk to them about distemper, and they had shown them round the place, in order to give them the benefit of learning of the most recent phases of their work. (Applause.) He would like to go back to the commencement of that work, some five years ago. They commenced absolutely *de novo*. They thought it would be quite wrong to start that investigation with any preconceived ideas as to the etiology of dog distemper, because at that time, and to-day he thought there were, two schools of thought—one that considered dog distemper to be caused by a bacterium which could be seen and grown, and another school which thought it was due to a filter passing organism, supporters of the Carré theory. They had, however, the advantage of the investigations of previous workers: to see where these had failed, which gave them the opportunity of trying to obviate such failings in their own work. Most of those failures were due to the fact that distemper broke out in the mixed experimental dogs (the infected and the controls) making all the work null and void, and by rearing their own dogs and ferrets they had avoided that. The kennel compound was erected for the breeding of distemper susceptible dogs and there had been no breakdown (except once, in the early days) for five years.

It was necessary in the first instance to get some new dogs into the compound. Accordingly, they bought some old pregnant bitches, of any sort of breed, and isolated them. They thought they should be old, because they would probably have had distemper and so probably be immune. Fifteen bitches were bought 5½ years ago, and these were bathed in lysol solution and cleaned up, and allowed to whelp in an isolated place on the farm. The puppies, when weaned, were transferred to a sterile box and carted down to the compound. They then had from 25—30 puppies, which were believed to be susceptible to the disease.

Previous to introducing those puppies into the compound they had to arrange for a competent and reliable staff. They considered that two kennel maids were sufficient. Both the first two girls who were employed were ladies in every sense of the word and were knowledgeable women in regard to dog breeding.

For the first 2½ years of the work the kennel maids successfully reared one hundred per cent. of the puppies born alive.

The question arose as to the proper scope of the work, and it soon became clear that if their work was not to be confined the number of puppies at their disposal would not be sufficient. The suggestion that ferrets be used came from Captain Douglas, their Director, and they had used them now for some years. They bred the ferrets themselves and up to the present had had no breakdown in the ferretry. Every time he went into the ferretry he said to himself that the attendants were to be congratulated on the way they looked after it, because they were not supervised. (Hear, hear.) The feeding of the ferrets and the dogs had been described to them, as had the use of the dog hospital by Dr. Laidlaw and the reason why that building was not used as a dog hospital.

The source of the first virus gave them some concern, because they did not want a mixture of diseases; and so they sent a susceptible dog away to be contacted with animals which had distemper. They called that the Rhodes virus, and that was going to-day. It had been carefully preserved and passaged. "I found," said Major Dunkin, "I knew nothing about experimental distemper in the dog and so we had to start *de novo* in that respect. We found that the incubation period of dog distemper is somewhere about three to four days; in outside cases it may be as long as five—six days. During that period it is literally impossible, in a large percentage of cases, to tell that a dog has got distemper, and we know it by the animal's temperature curve and because at that stage it is infective to others. That is very important from the clinician's point of view. I have formed the opinion that no one can diagnose distemper in its earliest stages unless he has got the temperature right from the word 'go.'

"If we were going to raise ferrets we had to decide whether or not dog distemper and ferret distemper were

one and the same disease. We claim to-day to have proved that they are and, so far as we can judge, no other animals than the members of the dog and ferret tribe are affected with dog distemper. We have successfully transmitted the disease to the stoat and the weasel, in which it was the nervous type which manifested itself, but to no other animals.

"The incubation period in the ferret is somewhere in the region of nine—ten days. The first symptom is a catarrh of the eyes and the presence of vesicles on the chin. The next day the eyes are purulent and the vesicles have extended, while the feet may be swollen and red. On the third day the eyes may be completely closed, owing to pus formation, the lips are swollen and covered with vesicles, and the animal is not feeding. Death usually occurs on the fourth or fifth day of the exhibition of symptoms. Only a very few recover—the death rate is something like 90 per cent.—but the recovered ferrets are then immune to further attacks.

"The *post-mortem* appearances in ferret and dog distemper are rather interesting. In the early stages of our work we almost invariably found queer lesions on the surface of the lungs. When we were able to transfer the disease by injecting some ground lung lesions we thought that they were in some way connected with distemper, but lately we have not seen them so frequently, and we have come to the conclusion that they are not constant and that they having nothing to do with distemper. A fairly constant feature is an enlarged spleen; also enlarged mesenteric lymphatic glands. But in cases of dogs suffering from pure distemper, with no complications, it is rare to see anything. Enlarged lymphatic glands are sometimes observed but nothing else."

In conclusion, Major Dunkin said that he had given them that brief introduction to the work and had brought it up to a certain stage with the object of leaving the remainder for Dr. Laidlaw.

Dr. LAIDLAW first thanked the Division for affording him the opportunity, which he regarded as a great privilege, of participating in their meeting. He understood that it was his duty to try and initiate a discussion, and he really did not know what of the many aspects of the subject would appeal to the majority of those present. He had, therefore, selected two important questions which he would like to bring forward for their consideration. The first was the nature of the infective agent in dog distemper, and the second the vaccination of susceptible dogs. Under the first heading, all their work, he thought, indicated that the view first propounded by Carré was correct, and that dog distemper was an acute infectious fever due to infection by a filterable virus, and that the bacteria which had been isolated from distempered animals from time to time had nothing whatever to do with the genesis of the disease. That view had been hotly contested ever since Carré first produced it. In the first place, people could not repeat Carré's filtration experiments successfully. Moreover, his theory carried with it the doctrine that the exhibition of all those purulent catarrhal changes which were so prominent a feature in many cases of distemper—for example, suppurative discharges from the eyes and nose, husky cough, broncho-pneumonia, gangrene of the lungs—had nothing whatever to do with the primary distemper infection in the dog. That meant, of course, that in nearly every case of distemper in the field one must regard the animal as infected by two different processes at one time.

He was always taught, as a medical student, that dual pathology for any one condition was bad Medicine and he supposed the same thing held in the teaching of Veterinary Medicine. But he could remember case after case of measles in which one had quite obvious secondary infections, so that the conception was not at all a novel one, and even if it had been so he thought they would have been driven to it as a result of the experimental work they had performed.

As his colleague, Major Dunkin, had explained to them, in experimental distemper in the dog they got an infectious fever and beyond the fever—high temperature, injected mucous menbranes, respiratory distress, wasting, etc.—there might be very little to show. Secondly, it was quite exceptional for them to see even a purulent discharge from the eyes and nose.

Broncho-pneumonia was extraordinarily rare. If one took a small quantity of blood from one of those experimental dogs—as little as one-thousandth of a cubic centimetre—and taken at the height of the first febrile period, that blood would be capable of infecting a susceptible animal, yet out of 5 c.c. of it nothing would grow in culture media; therefore one was able to infect an animal from an apparently sterile medium.

The infecting principle could be filtered through filters so fine as to keep back visible bacteria and the data which they had in regard to vaccination in animals supported, he thought, the Carré idea—the virus idea.

If they accepted that view, and he thought ultimately they would have to do so, it might put them in a very difficult position in the diagnosis of distemper in practice. They would have cases which were simple and straightforward, but the milder cases would be extraordinarily difficult unless they had a temperature record right from the start—and he took it that in the majority of cases they would not have one. The question of the vaccination against the disease had, of course, attracted many other workers on the subject, for the reason that the dog was notoriously an animal that developed a fairly solid immunity once it recovered from one attack of the disease, and a successful vaccination technique should therefore prove very valuable in practice. As a result of their experiences of experimental distemper they were inclined to the view that one attack of dog distemper, *however mild*, would confer a solid immunity. This immunity lasted for as long as they had traced any animal, and they were inclined to think it persisted for life. He dared say that many of them would disagree with that. But they found that they could put enormous doses of the virus which gave them the first attack into the recovered animals and they proved immune. The fact that they could get this solid immunity encouraged them, as it had tempted others, to try to induce full protection in the dog. Their conception of the proper technique of immunisation was different from that of others in that they regarded a vaccine as merely the first step—something which builds up the elements of resistance and thereby, forcing disease on the resistant animal, they could secure a mild attack of distemper, and recovery from this should render

the dog immune for life. They tried a number of bacterial vaccines and they were uniformly disappointing. The results were similar to those published by Hardenburgh, when he came to the conclusion that the vaccine did not influence the course of the disease or modify the mortality : the animal treated with a bacterial vaccine had no particular immunity. In contrast with that, they got highly successful immunity by vaccines made from the virus, and they regarded that as evidence that the bacteria isolated from distemper cases had nothing whatever to do with the genesis of the disease.

Vaccines made from the virus were prepared roughly in this manner : a dog (and the same held for the ferret, with certain modifications) was taken when it was exceedingly ill with distemper. The dog was killed ; the spleen, mesenteric glands and liver were taken out, put through a sausage machine and ground up in a mortar. The resultant product was mixed with saline and shaken vigorously. The connective tissue fibres were strained off through a double thickness of muslin. Enough formalin was added to give a strength of 1—1000, which killed the virus. On the table beside him were a number of temperature charts of dogs injected with vaccines and virus. Five c.c. of a successful vaccine injected hypodermically should render a dog resistant to infection by living virus after one week. The virus treated animal was immune. Since they had got those experimental results they had issued a certain number of doses of vaccine to interested people, and the vaccine had been tried on nearly 1,500 dogs. They had had reports from veterinary surgeons who had carried out the inoculations, and in many cases the reports indicated that these dogs had gone on in exactly the same way as had the experimental animals at the farm. There was, amongst the animals inoculated in the field, a far greater number of dogs showing a considerable degree of reaction to the virus than they would expect to see in their compound-bred animals, but there had only been three deaths following the administration of the virus.

It all depended on the after history of those animals as to whether they considered the results as really satisfactory. They knew that in certain cases the vaccinated animal had been in contact with fatal cases of distemper for long periods of time and had withstood infection, but it was possible for the immunity conferred by the vaccine and virus to deteriorate with the lapse of time—he realised that the period of time which they had observed in their experimental dogs was not very long in the majority of instances.

Dr. Laidlaw was followed by Professor WOOLDRIDGE, who said that there were one or two points of considerable interest that he would like to bring forward, but in the first place he asked to be permitted personally to express his appreciation of the trouble that Dr. Laidlaw and Major Dunkin had been to in showing them round the premises and explaining their work to them, and in giving them again, at first hand, an account of some of the splendid results they had obtained. (Applause.)

Some of the statements that had been made did not conform with ideas that had been held for a long time in practice, though that did not necessarily make them inaccurate. One frequently found, however, that the observations of clinicians, after having been thought fallacious by investigating scientists, had later been found to be correct. He might, therefore, be forgiven if he put forward one or two points which might not conform to the opinions that had been expressed by the investigators in question.

He was very glad indeed to hear the quite distinct statement with regard to the association, or lack of it, of the *Bacillus bronchisepticus canis* as the cause of distemper. It was a view he had held himself, as the result of observation purely, and he had held the view and taught for many years past that the *Bacillus bronchisepticus* had nothing whatever to do with the onset of distemper, although it might complicate the course of the disease. But, as against that, some of them might have read or heard that other workers had suggested that the *Bacillus bronchisepticus canis* exhibited a sort of pleomorphism, by means of which it might pass through a coarse porcelaine filter under certain conditions, and the fact that the organism incriminated by the present investigators was a filter passer suggested that the *Bacillus bronchisepticus canis* might, after all, be involved. He thought, however, that that suggestion might be dismissed altogether. But in America and Canada the belief that the *Bacillus bronchisepticus canis* was the cause of distemper was still held, and was, in fact, taught at the Ontario Veterinary College. Major Dunkin shook his head, but he had authority for that in the person of a student who had just taken his diploma at the Ontario College and was now in London.

With regard to the period of incubation, he was quite sure that Major Dunkin expected him to refer to that, for he (Professor Wooldridge) had asked him on several occasions concerning that point. Major Dunkin had stated quite definitely that the period of incubation in distemper was three to four days. (Major DUNKIN : I modified that by saying that it might be even as long as six days). He wanted a longer extension (Laughter.) That was, however, the first time Major Dunkin had extended the period beyond four days. He was glad he had extended it, because it made a serious difference to the clinical aspect of the case. He thought it probable that when one was working with a weaker strain of virus it might well prove that a longer period of incubation was necessary than was required by a more potent virus, but he must accept, without any qualification, the statement that with the strain of virus with which they had been working, the period they had stated was the period of incubation. The importance of the extension, clinically, was this—that if the limit to the period of incubation was six days, one would be perfectly justified in bringing a dog of susceptible age home from a show, and if he showed no symptoms of distemper, the daily temperature having been taken for six days, putting him into a kennel of valuable susceptible animals. But he, for one, would never accept that responsibility ; he thought it would be a wise precaution to keep the dog a longer period than that in quarantine. One's experience went to show that the period of incubation ranged from three days to three weeks, and he had every intention of continuing to act upon that assumption until there was more positive proof to the contrary in experimental work with other strains of virus, and infection under different conditions, and by different channels. A point of which he had made a note was answered by Dr. Laidlaw in the course of his remarks. He had been about to ask what was the association of the nervous symptoms that occur in distemper with the primary affection, because he had, at times, had some doubt in his mind as to whether the nervous complications bore the same relationship to the primary distemper as did the pneumonic and enteritic complications, but Dr. Laidlaw, in the course of his remarks, made it quite clear that in some instances, where there was no question of a secondary infection, nervous complications did arise. Then with regard to the question of a solid immunity. In the earlier part of his remarks in connection with this, Dr. Laidlaw rather emphasised that solidity, and went on to say that, in his opinion, that immunity might extend throughout the life of the dog. That, again, was a very important problem, because depending on that would also arise the question as to whether or not the dog might become affected a second time with distemper. He was of opinion

that a dog might have more than one attack of distemper; He had seen cases of distemper in young dogs and he had seen the same dogs, several years later, affected with a condition which was absolutely indistinguishable from distemper. Not only so, but the second cases had been responsible for distemper in young, susceptible dogs with which they had been brought in contact. It was that which made him feel that in some of the cases of distemper the immunity produced thereby might be a waning immunity, and that in course of time it might disappear altogether and the animal become susceptible again. Dr. Laidlaw mentioned that possibility in a later portion of his remarks, so he would like to have his opinion in that connection. It was important because not only had one to consider the advice one had to give to one's client, but it might involve some serious legal consequences from time to time.

Major DUNCAN wanted to know what distemper was. Probably there was no one else in the room quite so ignorant (laughter), but he would like an answer to that question. All the cherished symptoms which they, as clinicians, had sometimes presented to them had been abolished. (Laughter.) They got a dog running at the eyes and coughing, or exhibiting vomiting and diarrhœa, and the owner said "Is it distemper?" He replied "Oh yes, I think it is." Well, he was wrong. (Laughter.) There was, apparently, not the slightest sign in any of these cases, that the dog might have distemper. He would like to have a ruling on it, then he might be able to support Professor Wooldridge in his statement that a dog could have distemper a second time. He did know that a dog could exhibit, on more than one occasion, all the series of symptoms upon which they had been wont to rely hitherto.

Mr. J. WILLETT supported Professor Wooldridge's objection to the six day limit placed on the incubation period of distemper. He had well in mind a couple of sheep dogs that had been brought up from Cornwall and which had been in contact with a distempered dog a day before. He suggested that they should be isolated, kept warm, and a bi-daily temperature taken. This bi-daily temperature taking, before any symptoms showed themselves, lasted three weeks. Being puppies under six months old, their spirits were better than their health and they were eating well. The owners wanted to take them out, but he would not allow that. They showed no clinical symptoms for three weeks, which fact supported Professor Wooldridge's statement that the period of incubation, apart from the experimental period, had not been definitely settled.

Since Dr. Laidlaw and Major Dunkin had published their most interesting notes he had been bombarded with the question whether he could get the vaccine, in order that people could have their dogs vaccinated, and it would be interesting to know where the vaccine could be obtained in order that they might embark on the vaccination. The notes had aroused extraordinary interest amongst the general public, so possibly the authors would give some information with regard to that.

Mr. MALE congratulated Dr. Laidlaw and Major Dunkin, as he was sure they all did, on the magnificent work they had done during the last five years. It was very gratifying to them that a member of their profession, Major Dunkin, was associated with that work. (Applause.)

He was certain that they were working on the right lines. There was no doubt, he thought, from what they had seen that day and from the accounts that had been published in the various journals, that their work was absolutely sound, and he thought it would not be very long before that scourge would be prevented.

He was struck with the remarkable difference between the symptoms exhibited by experimental dogs suffering from distemper and those shown in the cases of distemper with which they met in practice, and he had been trying to think of any reason why that difference should exist. The only thing he could suggest was that the precautions taken to isolate dogs to be used for experimental purposes—in breeding them in the healthy way that they had—had excluded the secondary organisms operating in cases seen in practice. They had heard that day that those dogs were remarkably healthy, they did not get any disease whatsoever, and it was quite possible, therefore, that that excluded these other organisms. Yet he could hardly understand it, even so, for they had been taught that the pneumococcus (to take only one organism) was constantly present in the air passages of all of them, so that one would expect that when the virus had done its work the pneumococcus would be a ready invader, and that the various organisms that lined the digestive tract would also invade the body. It certainly was rather difficult to explain that difference in the symptoms.

He would like to ask if the vaccine was a sterile material, that is, was it free from the virus? He did not quite understand the term inactivated. In some dogs he had vaccinated with material very kindly sent him by Major Dunkin there was a rise of temperature in the vaccinated animals, while there was no rise after they had been given a dose of virus. He wondered if the virus was definitely killed or only attenuated.

He had noticed that the experimental dogs used at Mill Hill were all cross-breds and appeared to be of the hardy breeds. He would like to know whether Dr. Laidlaw and Major Dunkin had noticed any special susceptibility to the disease in the different breeds, also to its virulence. In practice they found that some breeds of dogs (big dogs, as a rule) appeared to have distemper very much more seriously than the smaller breeds.

Like some of the other speakers, he was a little dubious about the period of incubation, and his own observation had led him to think that it was longer than four days in those cases met with in practice. Of course, as had been said, it would be impossible to say exactly, in the short time that had elapsed, how long the immunity was going to last, but evidently the dogs vaccinated at Mill Hill had a strong immunity at present. The immunity was lasting extraordinarily well, and it would be very easy to vaccinate them again if they found afterwards that the immunity did not last more than two, three, or four years.

Mr. D. E. WILKINSON (a visitor) stated that he was indebted to Dr. Laidlaw and Major Dunkin for having sent him doses of vaccine and virus, which he had tried on thirteen or fourteen dogs. The thing that struck him was the extraordinary improvement which took place in their bodily condition when they had recovered from the fever set up by the virus. As a rule, there was a rise of temperature about the second day; then a fall; then a rise about the fourth day, and never to more than 104°. After that there had been no malaise, and the dogs had fed well and shown no rise of temperature at all. Moreover, there had been no rise of temperature in the first week after the administration of the vaccine until the virus had been given.

He would like to add his congratulations to those of Mr. Male for one of the most remarkable achievements which had ever been performed in research. (Applause.) He had tried every sort of vaccine that had been brought forward hitherto and he was quite convinced of their utter futility.

Mr. H. BELL (Hon. Secretary), said that he was not in a position either to argue or to disagree with many of the remarks that had been made that afternoon, but he would like to ask one or two questions.

What were the chances of a veterinary surgeon carrying that infection round the country? It made him shudder to think of that, when he saw the elaborate precautions taken at Mill Hill to prevent the introduction of the disease into the breeding compound.

The majority of those present rarely saw cases of pure distemper—he thought they were only called in to treat the complications. Possibly this was the reason why practitioners did not seem to carry infection about, to any great extent. Was it safe to receive dogs into one's own kennels to be vaccinated—in other words, just after vaccination was the subject likely to be a source of infection to other dogs in the kennels?

XUM

He would also like to know whether distemper affected aged dogs in a worse manner than it did puppies. In his experience, when aged dogs contracted distemper they seemed to get it in every shape and form and most of his had died or been destroyed.

Colonel G. K. WALKER said he understood that Dr. Laidlaw and Major Dunkin worked with one strain in the preparation of the vaccine they used. He was rather surprised that the analogy of foot-and-mouth disease had not been referred to in the course of the discussion, as they now knew that there were several strains of virus in that disease and he thought that Professor Wooldridge would recognise that the question of immunity might depend upon a recognition of that fact. Dr. Laidlaw and Major Dunkin might be perfectly entitled to say that the strain with which they worked produced complete immunity to subsequent infection from that strain, but would it give immunity to other strains ?

MR. WATERS (a visitor) said that when they injected the virus they had to do it intradermally. He had found that an intradermal injection was all right for a cow or some such thick-skinned animal, but it was not an easy matter to give puppies an intradermal injection. He wished to ask the reason for the adoption of the intradermal method of injection, also whether, if a mistake was made and one injected subcutaneously instead of intradermally, it would adversely affect the inoculation.

Mr. LITTLE (the President) desired to join with those who had congratulated Dr. Laidlaw and Major Dunkin on their work and its results. (Applause.) There was no doubt that they had accomplished a tremendous amount of good work, and they should thank them whole-heartedly for having the society there that day and giving them first-hand information.

It seemed to him that their ideas of distemper had been considerably altered. With regard to varieties of distemper, before the war, for several years, he had bred litters of ferrets and he had always thought that ferret distemper and dog distemper were entirely different conditions, because the experience he had was that he could keep his ferrets free from distemper in the same yard as contained his dog distemper cases. He kept his ferrets scrupulously clean, and Major Dunkin had admitted that day that if one was to keep them healthy, one must keep them clean. He (the President) never had a case of distemper amongst all his ferrets, and he kept them for several years quite close to cases of dog distemper. The explanation was given to them outside, when they were told that a control animal in a building would not contract the disease air borne, unless the infection was very heavy indeed.

It seemed that the ferrets, when they showed distemper symptoms, experimentally produced, exhibited conjunctivitis, but the dog did not.

Was it possible to set up, with the organisms which complicated the disease, some set of diseases or lesions which were not true distemper ? Would the *Bacillus bronchisepticus*, for example, produce symptoms without the distemper virus ?

THE REPLIES.

Dr. LAIDLAW, who was the first to reply to the points raised in the discussion, said that the incubation period, appeared to be the point where there was the greatest diversity of opinion between them—as they saw it under experimental conditions and as certain people had seen it clinically. He had been turning over in his mind whether there was any possibility of reconciling that wide divergence. In their experience four days was almost universal ; that was, if they took a dose of virus from a dog's spleen, or from a ferret's spleen, and injected a considerable number of infective doses, the incubation period would be about uniformly four days. If they diminished the dose to somewhere near the threshold it was still about four days. The dog-compound would not yield them enough puppies to enable them to do a large number of experiments to determine what was the limit of the incubation period. In the case of the ferret it was a fact that if one gave massive doses of virus one shortened the incubation period. He thought the shortest they had on record was five days. Dosage might therefore account for some of the differences, but he did not think they could stretch the incubation period as far as three weeks.

Professor Wooldridge's idea that a dog might carry the infection in his nasal mucosa, or somewhere, before it attacked him, was plausible, but if one infected a dog by putting virus on its nose the incubation period would in their experience remain about five days.

As to the nervous type of distemper, there was no doubt whatever, in his mind, that one did get an infection of the central nervous system. There were, however, other examples of nerve complications which they had not seen—the nerve complications that appeared very late. As to what the course of these was, he was not so certain. He thought it was possible that some of the late nerve symptoms—he did not mean chorea, but certain types of nervous disturbance and the lethargic conditions—might be due to some other infection.

As to the duration of the immunity and the occurrence of second attacks of distemper, he had wondered whether the condition that held for measles in man might not hold for dogs. In the ordinary way a man who got measles once was immune, but there were some unlucky people who never got an immunity to measles. He knew one man who had had seven attacks of measles, and it might be that, in the same way, some dogs never developed a really good immunity to distemper. He did not think that the suggestion that different strains of virus might account for the double attacks, would meet with their approval, for the reason that with the strains they had tried (over a dozen), if an animal was immune to one he appeared to be immune to all the others—and quite big doses of the others, too. Further, the immunised animals had been in contact with cases of distemper in different parts of the country, where it might be supposed the strains were different. On general principles, he would expect that in an animal that had been rendered immune the immunity would follow a definite sort of curve, and that one would have a large hummock at the maximum, and that it would diminish with the lapse of time. On general grounds, then, he thought they must expect the immunity to diminish, but he believed it to be true that, even so, there was an impress still left on the cells of the body by which an animal that had been immunised had a better chance of withstanding a second infection.

As to the difference in the symptoms in experimental distemper and in the distemper as seen in the field, he thought that the absence of secondary infections in their cases was accounted for by the fact that all the conditions were very healthy there, and that they injected dogs with a product which was bacteriologically sterile.

The reason that they advocated the subcutaneous injection of vaccine and the intradermal injection of virus was this—that the vaccine, as they used it, had been tested ærobically and anærobically for bacteria and was sterile ; it was never issued without these tests and unless it had been shown to protect a susceptible dog. They had never seen any evidence that after a four day period of treatment with formalin the vaccine contained any living organisms. If it did they would expect it to produce a febrile reaction in test animals and that they did not see. In the case of the virus, there was frequently a certain number of white staphylococci in it, because the ferrets from which the virus was taken got a row of abscesses round the chin, and from the spleen of those animals one could culture, in many cases, the *Staphylococcus albus*. It was quite a harmless organism, so far as they could make out, but the intradermal method of infection was advocated in order to rule out the possibility of the abscess formation due to the introduction of the staphylococcus. In actual practice, however, it did not seem to matter whether the injection was intradermal or subcutaneous.

One of the first sets of Foxhounds they ever dealt with, which arrived at the farm after having been transported in boxes by rail, exhibited, when they arrived, discharges from the eyes and nose, and his colleague said : "They

have sent us infected puppies; they are no use." Professor Hobday was there two days later and he said it was certainly distemper. From all those hounds they cultivated the *Bacillus bronchisepticus canis*, and he thought there was no doubt that they had a *Bacillus bronchisepticus* infection, but he thought that there was no doubt, also, that they did not have distemper, for the reason that one of the hounds was given virus straight away and it gave a typical reaction, the others were vaccinated and then given virus and they showed the usual type of reaction which they got in originally susceptible dogs. He thought, therefore, that there was no doubt that *Bacillus bronchisepticus* could produce a purulent catarrh without being associated with the distemper virus. At the same time, he thought that the two infections were very often associated.

Mr. Wilkinson had referred to the attempts to protect dogs by vaccination with calf lymph. This was a procedure originally tested by Jenner, but apparently subsequently abandoned by him, as he made no mention of it in his paper on Dog Distemper. Since Jenner's time the inoculation of calf lymph had been tried again and again, some observers considering it of great value and others finding it quite worthless. The procedure would seem to have been inspired by the erroneous idea that vesicopustules were an essential part of the distemper syndrome.

Major DUNKIN, who also replied, stated that, in the first place, he wanted to say, what he knew was in Dr. Laidlaw's mind also, how glad they were that the subject they had discussed that afternoon had been of such interest to the members of the Royal Counties Division.

The President and others, he remembered, had referred to the fact that they were grateful to them for introducing that subject at first hand, so to speak. It had been their custom, and it was still their endeavour, to make the veterinary profession aware, before anyone else, of what they were doing, and they proposed to adhere to that principle; hence, that meeting. (Applause.) He might say, in passing, that up to the present they had not yet issued the vaccine to anyone other than veterinary surgeons, except in three instances—to medical men, who were of course, almost equally interested in the problem.

The question of the incubation period had been dealt with very thoroughly by his colleague, but Professor Wooldridge made a specific reference to his (Major Dunkin's) expectation that he would raise it. Professor Wooldridge and Mr. Willett had raised some doubt as to whether or not the incubation period was what they (Dr. Laidlow and himself) said it was, namely, three to four days and, in the longest instances, possibly as long as six. Let it be clear that they had always, in their papers that had been published and certainly in their remarks that afternoon, referred to experimental distemper. He held to what he had already said about that—he quite agreed with his colleague that the incubation period of experimental distemper in the dog was what had been stated. Professor Wooldridge's cases were perhaps capable of explanation. Mr. Willett recommended that the dog be kept in isolation and the temperature taken twice a day for a period. He said the temperature did not rise to more than about 103°, but he was not very definite about the exact temperature. He (Major Dunkin) wanted to point out how necessary it was that if one advised that procedure, which was very sound, one must not only take bi-daily temperatures, but it was of enormous assistance to plot the curve. It was astonishing how much one could learn from a plotted-out curve, whereas one could learn very little from a series of temperatures. It would be very interesting to see the curve plotted out in Mr. Willett's case. With regard to the nervous type of case, he corroborated everything that his colleague had said. He had said that the brains of dogs suffering from experimental nerve distemper were bacteriologically sterile. That was so, but an interesting further experiment was that the intracerebral injection of distemper virus in susceptible dogs would not necessarily give the same type of distemper, and a similar injection of living distemper virus into dogs immune to the disease produced no untoward result.

It was Mr. Male, he thought, who referred to cases of some dogs, which he was immunising with their vaccine, which had shown a curious rise of temperature after the vaccine and not after the virus. That point was dealt with by Dr. Laidlaw, who had said that they tested their vaccines before they were sent out. The explanation might be that that particular dog acquired a natural infection some few days before he received the vaccine. The other question, of the severity of distemper as attacking different breeds of dogs, was nearly threadbare; it was constantly cropping up. He had never held the opinion that any particular breed was more susceptible than another and he did not to-day. Their experience went to show that every breed of dog about which they had now heard was more susceptible than another one. That sounded rather Irish, but what he meant was that they had many complaints from dog owners—Masters of Foxhounds, and so on—who promised to use their vaccine, and one could produce letters from these breeders, which in many instances contained the expression "Of course you know how much worse this particular breed has distemper than any other. (Laughter.) Personally, he held the view that overcrowding was the ideal way to spread distemper. The animals took it at the optimum period and constant passage and re-passage spread it amongst all the susceptible animals. That, to his mind, explained the question why distemper broke out year after year in Foxhound kennels. It was not due to the fact that the distemper infection remained in the kennels year after year—he did not think that was very likely.

Mr. Bell had asked him whether it would be wise or unwise to vaccinate susceptible puppies while they were in kennels. That was a matter of opinion; he thought, with regard to veterinary surgeon's kennels, one should take the greatest possible care, but he should say very definitely that he did not mind what degree of care they took, they could not guarantee that they had not got a distemper case in their kennels or that they had not imported one. In that case it would not be wise, as their dog might have a mild infection on him.

The PRESIDENT: Are inoculated dogs infective?

Major DUNKIN said that the answer to that was, he thought, that they were not, because they had never yet succeeded in transmitting the disease, by ordinary contact, from such animals. It was very unusual indeed for such vaccinated animals, although showing a rise of temperature on the fourth day after virus injection, to show a coryza, and it was the appearance of coryza stage which made infection possible, he thought.

One other point—one which had not been raised, but to which he wanted to refer. He was not casting reflections, of course, but he did want to show them how important it was that those of them who proposed to undertake that method of prevention of the disease should realise that the instructions issued with the vaccine should be rigidly carried out. It was absolutely essential that strict antiseptic precautions should be taken.

In conclusion, Major Dunkin remarked, amid laughter, how very relieved both Dr. Laidlaw and himself were, that the word "hysteria" had not been mentioned. They were indeed grateful to the members of the Division for the appreciative and considerate way in which they had listened to what they had had to say to them that afternoon.

The meeting concluded with the according of hearty votes of thanks to Dr. Laidlaw and Major Dunkin for their demonstration, to Mrs. Dunkin for her kind hospitality and to the retiring President (Mr. Little) for his conduct in the Chair.

H. BELL, *Hon. Secretary.*

North Midland Division.*

Officers Elected at Sheffield Meeting.

A meeting of the North Midland Division, N.V.M.A., was held at the King's Head Hotel, Change Alley, Sheffield, on November 27th, 1928.

The following members were present :—Mr. G. J. Furness (in the Chair), and Messrs. J. Abson, T. Bowett, A. D. J. Brennan, W. Collinson, T. C. Fletcher, R. Hudson, E. Marrison, S. H. Nixon, M. Robinson, S. E. Sampson, H. Thompson, W. Tweed, A. Walker, and J. S. Lloyd (Hon. Secretary).

Apologies for absence were received from Messrs. W. Murgatroyd and E. G. Johnson.

The minutes of the previous meeting, which had been published in the *Veterinary Record*, were taken as read and confirmed.

The minutes of the Council meeting held at 3 Ellin Street, Sheffield, were read by the Secretary.

Correspondence.—(1) From the Secretary of the National Horse Association of Great Britain and a pamphlet giving particulars of the association were read to the meeting. It was unanimously resolved that the Division become an affiliated society for the year 1929, the Hon. Treasurer being instructed to pay the subscription fee of £1 1s. 0d.

(2) From the Hon. Treasurer of the Victoria Veterinary Benevolent Fund, stating that the Council of the Fund would be pleased to send a collecting box to be placed on the table at meetings of the Division. After some discussion, it was resolved that the sum of £2 2s. 0d. be granted to the Fund, and members were asked to subscribe individually as much as possible, sending direct to the Treasurer of the Fund.

(3) Correspondence relating to the R.C.V.S. and the R.S.P.C.A. *re* free treatment by veterinary surgeons of sick animals of the poor. This provoked considerable discussion and no agreement was reached as to the utility or practical application of such a scheme. The feeling of several of the members was that such a scheme would be of no more value as regards poor people's animals than the conditions now obtaining, because veterinary surgeons now did a considerable amount of work at reduced fees for people whom they themselves considered deserving cases.

Mr. Tweed suggested a scheme by which the R.S.P.C.A. should pay a fee for the services of a veterinary surgeon for certain periods, say two or three hours per week, at a centre, and in cases of emergency at his own surgery. The fees should be acceptable to that Division and a panel of veterinary surgeons should be formed who would be willing to accept these fees for the periods agreed upon, the necessary arrangements to be made by a Committee appointed by the Division, together with representatives of the R.S.P.C.A.

After further discussion, Major Abson proposed that the matter be left over to the next meeting of the Division ; at the same time he impressed on the members the fact that at present there were other societies employing unqualified persons to attend sick animals—not only of the poor and deserving—and that for that reason they should not be content to let such work be carried on if they could alleviate suffering in animals. He would propose that each veterinary surgeon give the matter his full consideration and suggest any scheme he thought practicable to the next meeting. The proposition was seconded by Mr. Marrison and carried.

Election of Officers for 1929.

Mr. C. S. Smith proposed that Mr. J. S. Lloyd (Sheffield), who had been Hon. Secretary since the formation of the Society, be appointed President for the ensuing year. He said that no man could have done more for the Society than Mr. Lloyd had. His advice had been very valuable and freely given, and he had at all times carried out the large amount of work attaching to the post of Hon. Secretary in a most satisfactory manner. All would agree that the Division would be honoured in honouring Mr. Lloyd, if he would accept the office.

Mr. Fletcher, in seconding, said that no words of his could express Mr. Lloyd's qualities and he had much pleasure in seconding the proposition. The meeting unanimously agreed.

Mr. Lloyd, on rising to reply, was heartily applauded. He said it was exceedingly difficult to refuse, in face of the warmth of feeling which had been shown, to take over the position of President and he hoped he would be able to be of service to the Division.

Past President: Mr. G. J. Furness.

Vice-Presidents: Messrs. Angler and Scott.

Hon. Secretary: Mr. Lloyd proposed that Mr. Tweed, who had been acting as Assistant Secretary, be elected. Mr. Sampson seconded the proposition, which was unanimously carried.

Hon. Treasurer: It was unanimously agreed that Mr. Thompson be re-elected.

Auditors: Messrs. Sampson and Fletcher.

Council: Messrs. G. Green, R. Hudson, M. Robinson, W. Collinson, C. S. Smith, and T. Bowett.

Nominations to Membership: Mr. G. D. Coward, Ministry of Agriculture, Sheffield, and Mr. D. D. Canning, Assistant Veterinary Officer, West Riding County Council, were nominated for membership of the Division.

The Hon. Secretary said that as the Annual Congress of the Royal Sanitary Institute was being held in Sheffield in July, 1929, he proposed that that Division do something by way of bringing the veterinary delegates attending the the Congress together. He left it to the members to decide as to the form of attraction. He recalled one occasion when such an effort was made, namely at a Sanitary Congress at Brighton, when the delegates were delighted at the reception and the opportunity afforded of meeting one another.

After some discussion, Mr. Tweed proposed that a Committee be formed to act upon Mr. Lloyd's suggestion and to report at the next meeting. The following Committee was appointed : the members of the Council (*ex-officio members*), Major Abson (Sheffield) and Mr. C. S. Smith (Barnsley), as Chairmen, and Mr. Tweed (Sheffield), as Hon. Secretary.

Morbid Specimens and Interesting Cases.—In response to the President's request of any member who had interesting specimens or cases to give to the meeting, to present them, Mr. R. Hudson (Retford) showed a specimen of

* Received on 11th December.

spinal tumour in a horse, with Dr. Hare's report on it, which will be published in the *Veterinary Record* at a later date. He also gave details of a case of obstruction in a cow's teat where he successfully removed the small papilliform growth by making an incision on the outside of the teat into the sinus and dissecting it.

In reply to questions, Mr. Hudson said that the cow in question was a heavy milker and on drawing the teat the obstruction seemed to get into the apex and stop the flow and when dilated would retract and could not be found. He asked to be allowed to open the teat and the owner agreed to take the consequences. He had the quarter milked out and then applied a clamp over the base of the teat. He injected 5—10 m.m. of a 5 per cent. cocaine solution into three places. He then flushed out the teat with a mild antiseptic and made the incision with the cow standing. He had difficulty in finding the sinus, but put up a director and found it and enlarged the incision along the director. He then squeezed out the growth, removed it and stitched the sinus with a continuous suture and the outside skin with interrupted sutures. A good deal of hæmorrhage had to be contended with, as there was slight inflammation in the teat with the previous handling. The cow has been milked since and the wound seems to be going on well.

The PRESIDENT then called upon Mr. A. Walker to read his paper on "Swine Fever," which, together with the discussion which ensued, is reproduced at the commencement of this issue of the *Record*.

Following the passing of a hearty vote of thanks to the essayist for his greatly-appreciated paper, the meeting terminated with a hearty vote of thanks to Mr. G. J. Furness for his conduct in the Chair and the way in which he had carried out his duties as President. This was proposed by Mr. SAMPSON and seconded by Mr. LLOYD, who said that when Mr. Furness was appointed he knew after the first meeting over which he presided that the right man had been chosen.

The PRESIDENT, in reply, thanked all the members for their support during his year of office, the duties having been particularly light and pleasant to him.

J. S. LLOYD, Hon. Secretary.

Health and Utility Endurance of Dairy Cows.

ROYAL AGRICULTURAL SOCIETY INQUIRY.

A recent issue of *The Times* contained the following important contribution from the pen of its Agricultural Correspondent:—

"The Research Committee of the Royal Agricultural Society has initiated an investigation into a problem of supreme importance to the farming industry—the health and utility endurance of dairy cows. The fact that this question should hitherto have had little attention paid to it in the matter of serious and sustained research is remarkable. Anything that concerns the breeding and milking properties of our cattle in general, and dairy herds in particular, is basic and far-reaching in its influences upon farming pursuits. It has only to be remembered that 70 per cent. of the total revenue from the industry is derived from animal products to understand and appreciate the urgency of investigating diseases, obscure, common, or even trivial, with a view to keeping them under reasonable subjection. There is nothing to be gained now by bemoaning the relative neglect of animal questions in our research work; the supreme point is to devote to the predominant section of the comprehensive industry attention proportionate to its fundamental significance. The Research Committee of the Royal Agricultural Society suggests no diversion of money or effort from existing inquiries. All that has been attempted is to direct attention to a glaring defect in research work and to indicate, on its own practical initiative, the line of inquiry that might be pursued.

"Some time ago interest in the wastage in dairy cows was aroused by a statement by Mr. Robert Hobbs, of Kelmscott, to the effect that the average milking life of a dairy cow was 2½ years. The suggestion was so remarkable that Sir Merrik Burrell and others determined to put it to the test. As owners of dairy herds themselves, they had an additional interest in the question, and at their instigation the Research Committee of the Royal Agricultural Society—with the approval of the Finance Committee and the Council—resolved to conduct an initiatory investigation into the matter. The services of Dr. Minett, Director of the Research Institute in Animal Pathology at the Royal Veterinary College, were enlisted for the work, and the results of his preliminary inquiries respecting mastitis, in conjunction with investigations as to general losses in cows in West Sussex, have more than confirmed Mr. Hobbs's assertion. It has been found from carefully collected data that in West Sussex the average period of useful milking service of a cow is two years three months. The discovery has excited considerable comment, and it should induce a system of research corresponding in scope, penetration and impartiality to the supreme importance of the issues involved.

DEPRECIATION IN COWS.

"I was discussing the subject of milk production and prices with a careful student of economics the other day, and he made the remark that the usual method of giving premier place to food as the chief item in the bill was wrong, or open to question. Feeding and labour are commonly reckoned to be the chief outlays, but before either he placed the depreciation in cows. The point will vary in significance with individual experience, of course, but the fact that so competent an observer should have given such prominence to the point demanded attention, and in view of the inquiries in West Sussex, supplementary to the statement of the owner of the Kelmscott herd, it would be unwise to reject the claims of this regrettable side of the business to the distinction of a leading place in the expenditure accounts. A disquieting feature of the case is that this class of loss is increasing. It appears that, whereas an allowance of 1d. a gallon of milk used to be made for depreciation in cows, the amount has now risen to 2½d. a gallon.

"The losses resulting from what are presumably preventible diseases are made up under a comprehensive head. A Derbyshire veterinary surgeon (Mr. A. Levie) has estimated the number of immature calves born annually in Great Britain at 100,000, and the consequent financial loss at £1,000,000. These formidable figures are based upon his own experiences, and there is no reason to question them in the absence of concrete evidence to the contrary. This professional computation gives support to the contention of the economist already referred to.

AGE OF FULL CAPACITY.

"The results, or suggestions of Dr. Minett's original inquiries on behalf of the Royal Agricultural Society should be studied in conjunction with a comprehensive report of relevant, though not parallel, investigations made by Dr. J. F. Tocher, of Aberdeen, (the Biometric Laboratory, University College, London). It will be remembered that Dr. Tocher gave some hint of this approaching volume in the paper he read at the British Association meeting at Glasgow, and the figures set forth represent work of an extremely intricate nature, extending over many years, and based upon the milking records of more than half a million cows. The comprehensive records disclose many points of practical importance to dairy farmers, but their

immediate value in reference to this question is that they point to the age of nine to 11 years as the period when cows are at their greatest milking capacity. If it be assumed that the average milking term of cows be only 2½ years, or less, it follows that a great proportion of the cows of the country never reach the highest period of production, but have been discarded, from one cause or another, at heavy sacrifice in price, long before they attain nine years.

"It would be unwise to dogmatise as to the chief causes of the formidable losses indicated. Prudence advises patience for further evidence on the question. It has been hinted, however, by Dr. Minett's inquiries and from other sources that concentration upon heavy milk production is not remotely connected with udder and breeding troubles. Sir Merrik Burrell has stated that in the West Sussex investigations the curves of mishaps and deep milking have moved to a suspicious extent in harmony. The adoption of the milk-recording system has served dairy farmers well, but it has always been feared in some quarters that excessive pursuit of immediate results in milk might endanger the constitution and enduring qualities of the animals. It would be premature to draw definite deductions at this stage, and the question may well be left to be sifted by Dr. Minett and his colleagues now engaged in examining the nature and extent of some of the troubles afflicting in varying degree the whole business of cattle breeding, and dairy farming especially."

NOTES AND NEWS.

The Editor will be glad to receive items of professional interest for inclusion in these columns.

Readers are requested to note that all communications for the Notes and News or Correspondence columns for next Saturday's issue must reach this Office not later than FIRST POST ON MONDAY NEXT.

Diary of Events.

Dec. 31st—Meeting of the Editorial Committee N.V.M.A., 10 Gray's Inn Square, W.C.1, at 4-30 p.m.

Jan. 8/29—N.V.M.A. Council and Committee Meeting.

Personal.

Appointment.—The Governors of the Royal Veterinary College have appointed Mr. J. G. Wright, F.R.C.V.S., Cardiff, to the post of Professor of Materia Medica and Therapeutics in succession to Mr. A. R. Smythe, F.R.C.V.S., who recently retired from the service of the College.

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Municipal Honour.—The Mayor of Carnarvon, Mr. D. Elliott Alves, of Bryn Bras Castle and Devonshire House, W., is President of The British Controlled Oilfields and other important undertakings which necessitate his absence abroad for most of the year. He has re-appointed Councillor L. W. Wynn Lloyd, F.R.C.V.S., as Deputy Mayor.

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Mr. Simon Sharp Seriously Injured.—All members of the profession will be sorry to hear that Mr. Simon Sharp, M.R.C.V.S., D.V.S.M., recently appointed as an Assistant Veterinary Officer to the West Riding County Council, met with a serious motor accident on Sunday evening, December 9th. Mr. Sharp was driving in a friend's car, when the car skidded and overturned. He is now lying in the County Hospital at York, having been for some days in a critical condition, suffering from a severe head injury. Our informant, writing again on Monday last, says: "I am pleased to inform you that, so far, Mr. Sharp is making good progress towards recovery, though of course it is as yet too soon to say that he is out of danger."

We are relieved to learn also, from a late message from Reading, that we can report excellent progress on the part of Mrs. Male who, as recorded last week, sustained serious injury as the result of an accident while hunting with the South Oxon. Drag.

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Colonel Young and the Royal Institute of Public Health Congress.—The Corporation of the City of London has given Colonel Dunlop Young, the City Veterinary Officer, permission to accept the invitation of the Royal Institute of Public Health to become Vice-President of the Veterinary Medicine and Meat Hygiene Section of the Congress to be held in Zurich from the 15th to the 20th May, 1929, and to read a paper on "Meat Production, Inspection and Transport," illustrated with lantern slides. They have also granted him a sum of money to defray his expenses. Colonel Young has now an almost unique experience and knowledge of meat production and meat inspection throughout the world, having visited Argentina, Australia, Belgium, Brazil, Canada, Ceylon, France, Holland, Honolulu, Italy, New Zealand, Portugal, Patagonia, Paraguay, Uruguay, and the United States of America.

Proposed New Agricultural Research Bureaux.

In pursuance of a recommendation made at the Imperial Agricultural Research Conference, 1927, meetings attended by the representatives of the various parts of the Empire have recently been held in London. The proposals there formulated are now before the Governments. They should, if adopted, have far-reaching results on the furtherance in the Empire of scientific agricultural research. The establishment of eight new bureaux or clearing houses of information is recommended. Each bureau would under these proposals deal with a separate branch of agricultural science. All the bureaux would be financed from a common fund formed by contributions from the different Governments. The control of this fund, as well as the general supervision of the bureaux, would, according to the scheme, vest in an Executive Council composed of representatives of the contributing Governments.

The various bureaux would be attached to existing research institutes, the governing bodies of which have already accepted the general principle of the proposal.

The scheme contemplates placing the Bureau of Soil Science at the Rothamsted Experimental Station, Harpenden, Herts; of Animal Nutrition at the Rowett Institute, Bucksburn, Aberdeen; of Animal Health at the Veterinary Research Laboratory, Weybridge; of Animal Genetics at the Animal Breeding Research Department, Edinburgh University; of Agricultural Parasitology at the Institute of Agricultural Parasitology, near St. Albans; of Plant Genetics (for crops other than herbage plants) at the Plant Breeding Institute, Cambridge; of Plant Genetics (for herbage plants) at the Welsh Plant Breeding Station, Aberystwyth; and of Fruit Production at East Malling Research Station, Kent.

It is proposed that the directors of the research stations to which the bureaux would be attached should be the Directors of the Bureaux. Men of world renown in their respective scientific fields would thus be associated with the bureaux from their inception: Sir John Russell, Dr. J. B. Orr, Dr. W. H. Andrews, Professor F. A. E. Crew, Professor R. T. Leiper, Professor Sir Rowland Biffen, Professor R. G. Stapledon, and Mr. R. G. Hatton. It is further proposed that each director should have a body of official correspondents—specialists—nominated by the different Governments to assist him in the work of the bureau; one correspondent would be nominated for each bureau in each of the contributing countries.

Sir Robert Greig, chairman of the Board of Agriculture for Scotland, is proposed as chairman of the Executive Council.

It is also announced that the Government of South Africa has agreed that the Veterinary Research Station at Onderstepoort shall serve as a link in the Imperial stations.—*The Times.*

"John Bull" and the Distemper Investigators.

John Bull published, in its "Candid Communications" column, on December 8th, the following, addressed to Dr. P. P. Laidlaw and Major G. W. Dunkin:—

"Gentlemen,—Your patient researches have discovered the cause and prevention of distemper in dogs. I congratulate you from the bottom of my heart. Veterinary research, on the whole, is woefully lethargic and behind the times. If the Royal Veterinary College would only take a leaf out of your book, and find the cure of those diseases which destroy hundreds of thousands of valuable animals each year, it would earn, as you have done, the gratitude and applause of the nation.—JOHN BULL.

"P.S.—My bulldog sends hearty barks of joy."

In regard to the above, Mr. J. F. D. Tutt, M.R.C.V.S., of Winchester, has sent the following letter to the Editor of *John Bull*:—

"*December 6th*, 1928.

"TO THE EDITOR OF 'JOHN BULL.'

"Sir,—With reference to your 'Candid Communication' addressed to Dr. Laidlaw and Mr. G. W. Dunkin in your issue dated December 8th, allow me, as an old reader of your paper and a member of the veterinary profession to which you refer, to point out:—

"(1) That Mr. G. W. Dunkin is a member of the veterinary profession and held the rank of Major in the R.A.V.C. during the late war. No mention has been made of this fact in any of the notices that have appeared in the various newspapers, nor in your 'Candid Communication.' This alone, rather puts your statement about veterinary research 'out of court.'

"(2) Veterinary research is NOT lethargic, but it is hampered by lack of financial support and the apathy of this country and its governments. When it is found that, in the vast majority of cases, the inspection of meat, milk etc., is entrusted to (sanctioned by the responsible authorities) sanitary inspectors, the encouragement vouchsafed to the veterinary profession in this country can be well gauged. When referred to in the Press, it is only in terms of abuse and to cite a recent instance, the abuse poured out during the recent foot-and-mouth disease outbreak in Cheshire occurs to the mind at once.

"(3) You state that if the Royal Veterinary College (I presume you refer to the building at Camden Town) took a leaf out of the book of these gentlemen, it would earn the gratitude and applause of the nation. Surely you are not so woefully unaware of the financial position of the College that is 'within your gates,' and which is struggling to raise sufficient money for rebuilding, as to compare it with a research which was started and had no lack of financial support by the '*Field* Distemper Fund.' Although funds and legacies are poured into the coffers of a concern (loudly vaunted in the Press) that employs unqualified persons to treat the sick animals of the poor, research work is expected to be carried out by a College that at present has not raised sufficient money to carry out rebuilding. Given the financial assistance and recognition that is given in every other country but our own, the Colleges would be able to carry out the research you yearn for. A visit to the Colleges in other countries, followed by a visit to that one to which you refer, would enlighten you considerably.

"In all cases of research, it is the question of £ s. d. that rules. Brains alone are useless. Your comparison, therefore, of the Royal Veterinary College with very little money for rebuilding, let alone research, to a research investigation that had and has no dearth of financial assistance for research alone, is utterly ridiculous.—Yours faithfully, F. J. D. TUTT, M.R.C.V.S.

"1 St. Cross Road,
Winchester."

REQUEST FOR LEGISLATION ON MILK GRADING IN THE FREE STATE.

"A petition praying for the introduction of legislation to ensure a safe milk supply in the Irish Free State has been presented to the Minister for Local Government and Public Health by representatives of the Irish Clean Milk Society, says the *British Medical Journal*. The signatories include 99 doctors and matrons of hospitals, and, in addition to urban and rural district councils, many public bodies subscribed to the petition, among them being the Cork Chamber of Commerce, the British Legion (Benevolent Department), Irish Labour Party and Trades Union Congress, Dublin Cowkeepers' and Dairymen's Association, Irish Transport and General Workers' Union, County Westmeath Committee of Agriculture, Irish Nurses' Union, Women's National Health Association, Irish Women Workers' Union, God Save the Children Fund, and St. John Ambulance Brigade. The representatives of the society suggested the restriction of the use of terms designating milk, such as "Certified," "Grade A," etc., and further urged that pasteurized milk should be labelled as such until the introduction of legislation. At present those terms have no Government or departmental sanction, and therefore carry no guarantee as to the safety or purity of the milk. The Minister was extremely sympathetic, and gave an assurance that the report of the Inter-Departmental Committee on Milk Supply would not remain a dead letter, saying that the matters raised in the report were being fully examined by a specially appointed departmental committee, and that he hoped to receive this committee's report before Christmas. He intimated that he would receive another deputation from the Clean Milk Society in January, when he would be able to say how matters were progressing.

NATIONAL PONY SOCIETY.

At a recent meeting of the Council of the National Pony Society, it was reported than an entry of 35 fillies and 34 colts had been received for the 1928 Supplement for young polo ponies. This was an increase of 20 over the number received for the last Supplement in 1927, and was satisfactory as indicating that more polo ponies were yearly being bred in this country.

The President (Sir A. Weigall) stated that details of several centres established for the training of young ponies for polo had been brought before him. The demand for polo ponies was, he said, in excess of the supply, and when likely animals were bred there was a difficulty in marketing them, as many breeders were unable, or had not the facilities, to train them. He therefore suggested that such training centres—where buyers could see ponies in bulk, of different types, and owned by a number of breeders—might receive the imprimatur of the Society.

The Council, after very careful consideration, decided that the three training centres brought to their notice should be inspected, and that, if they complied with the principles approved by the Council, they should be brought to the notice of breeders and members through the medium of their Show Catalogue and Report.

XUM

"Agricultural Research in 1927."

The third volume of the annual summary, prepared by the Royal Agricultural Society of England, of the scientific and economic research work in agriculture at home and abroad has been issued (John Murray, 1s. 3d., post free). Started two years ago at the instance of the research committee of the society as an experiment, the publication seems to have established a definite place in the periodical literature of the farming industry. The volume concludes with Sir John M'Fadyean's summary of the progress of "Veterinary Research" during the year. The summary makes it clear that research in foot-and-mouth disease, as in other diseases, is being vigorously pressed. Dairy farmers are given advice as to the best methods for combating epizootic abortion.

For the assistance of students and others desirous of consulting original sources of information each section of "Agricultural Research in 1927" concludes with a complete bibliography of papers quoted. The price of the booklet has been reduced in order to secure the widest possible circulation.

CORRESPONDENCE.

Letters to the Editor should reach the Office not later than by the first post on Tuesday morning for insertion in following Saturday's issue.
All correspondence must bear the name and address of the contributor for publication.
The Editor does not hold himself responsible for the opinions of his correspondents

Constitution of Council, N.V.M.A.

To the Editor of The Veterinary Record.

Sir,—On the 13th November an Extraordinary General Meeting of the N.V.M.A. defeated a resolution confidently put forward by the Council for electing by ballot 25 additional members of the Council. This result might be taken as evidence that the Association is divided against itself. It cannot, at any rate, strengthen the Society.

Why has this position arisen? Simply because the Council is elected in a rather haphazard way by the Divisions which, often enough, are more concerned with their own arrangements than with the welfare of the Association as a whole.

The remedy is obvious. The Council should be reduced in numbers (for at present it is very unwieldy) and elected by ballot by the whole membership, regardless of the Divisions. One man, one vote. At present members of the N.V.M.A. who do not belong to a local Society seem to have no voice in its management, but members N.V.M.A. who belong to more than one local Society have more than one vote in electing the Council.

Councillors elected in this way after having taken the trouble to be nominated would probably take greater pains to attend Council meetings. The great advantage of the present method is that of territorial representation, but surely territorial representatives, who do not attend, are not so useful as universal councillors who do.—Yours truly,

Bernard Gorton.

22 Arnewood Road,
Bournemouth, Hants.
December 16th, 1928.

Identification.

To the Editor of The Veterinary Record.

Sir,—That evergreen subject "The Examination of Horses as to Soundness" can and always will provide interesting material for discussion and controversy.

There is, however, one very important item in connection with this particular job that is never mentioned and never discussed, and which is, I think, badly in need of consideration. I refer to the matter of the description or identification of the horse.

The vagaries of description at present allowed and indulged in by members of the veterinary profession would provide food for the humorist, and are often so inconsistent and ambiguous as to make it impossible for one to ercognise the animal described.

I have for long thought of directing attention to this matter, and recently I have had the pleasure of reading six certificates from six different practitioners in various parts of Ireland, England and Scotland in reference to the same horse and the descriptions of the horse are so different that I think it full time that the matter was discussed, with a view to evolving some intelligible standard.

Four certificates described the horse as being a chestnut, one a roan and one piebald chestnut. One described him as having white socks, another as having white stockings—I don't think the horse wore socks or stockings. Another described white heels; one described white legs and the other white feet, while one of them also alluded to a star on his forehead, as if the star was ever on the ear or tail.

Now each in his own locality may have been using terms looked on as correct in the locality, but there is a want of uniformity that should not obtain in scientific circles and should not be permitted to continue.

There was, I think, a very excellent and intelligent method of description in use with the British Army horses that might provide a suitable basis of standard and I hope some of your readers will pursue the matter and help to evolve an acceptable routine that would be a little more classical and in accordance with the work of expert science.

Ennis. P. J. Howard.

December 11th, 1928.

[Mr. Howard may be pleased to know that this matter is now the subject of consideration by a sub-committee appointed by the R.C.V.S., who are expected to report in the near future.—Ed.]

Research on Tuberculous Animals.

To the Editor of the Veterinary Record.

Sir,—I have been advised by the Royal Veterinary College to apply to you asking you to insert in your journal an enquiry on the following subjects with regard to research work that has been done anywhere on tuberculous animals under these heads:—

1. Special feeding to fatten up sick animals suffering from loss of weight, such as with the use of cod liver oil and oils and fats after treatment with ultra-violet light.
2. Experimental use of ultra-violet light on glands (knowing the wonderful effect on tuberculous glands in humans). Have any experiments been done on animals like calves, or cows with tuberculous ulcer on the udder, rabbits or guinea pigs?
3. Radium, and water containing radium emanations. Has any work been done on any animals suffering from tuberculous disease or with any form of malignant growth?
4. Salts of mercury. I understand that in America some workers have had considerable success with the use of these on tuberculous lesions. Has any work been done here in the United Kingdom and, if so, with what success?
5. Has anything been observed by way of the effect of certain plants on tuberculous disease in animals, and have any experiments been made with the use of garlic?
6. What has been done with the use of high frequency and other electrical currents, and X-rays?

I should be so very much obliged if you can help me to get in touch with all the research work that has been done in the veterinary world on these subjects.—Yours truly,

Gordon Tippett, M.B. Lond.

December 15th, 1928.

[We shall be pleased to open our correspondence columns to any communications we may receive on this subject.—Ed.]

The Editor acknowledges the receipt of the following:—

Communications from Messrs. R. C. Holmes (London), M. MacColl (Helston), Major-General Sir John Moore (London), Messrs. H. L. Roberts (Ipswich), Henry Taylor (Hayward's Heath), E. L. Taylor (Weybridge), H. L. Torrance (Birkenhead), and Lt.-Colonel T. Dunlop Young.

Report of the Annual Meeting of the National Veterinary Benevolent and Mutual Defence Society, from Lt.-Colonel J. W. Brittlebank, Hon. Secretary.